

OCEANOGRAPHICAL STATION LIST

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Volume 3

Hydrological and Planktological Observations

by F.R.V. *Warreen* in South-western

Australian Waters, 1947-50

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OCEANOGRAPHICAL STATION LIST

OBSERVATIONS MADE BY F.R.V. *WARREEN* IN SOUTH-WESTERN
AUSTRALIAN WATERS 1947-50

Compiled by D. J. ROCHFORD

FOLLOWING a period of war service, F.R.V. *Warreen* was recommissioned for research in 1947. Since that date she has been stationed at Perth and has undertaken oceanographical work in south-western Australia.

I. OCEANOGRAPHY

Most of the cruises have been concerned mainly with the survey of pelagic fish occurrences in either south-west or north-west Australian waters. During the early cruises no hydrological observations were made, but plankton hauls were taken at regular stations. Subsequently, however, the area was traversed by oceanographical section lines at the following localities: Bald Head — King George's Sound, Rottnest Island — Fremantle, Hummock Island — Geraldton, Cape Inscription — Sharks Bay. On each of these section lines stations were worked at distances of 10, 20, 30, 40, 60, and 100 miles off shore.

II. HYDROLOGICAL OBSERVATIONS

Owing to alterations amidships in the post-war refit, the space allocated to a laboratory in the pre-war design of F.R.V. *Warreen* was drastically reduced and shipboard laboratory nutrient determinations were impossible. The section lines were, therefore, selected in close proximity to air transport terminals and the samples despatched to the Perth laboratory as soon as possible after collection. The time between collection and analysis rarely exceeded two to three days. Some storage errors in the nutrient results are therefore possible, although no quantitative estimations can be given.

(i) *Temperature*.—Temperatures were taken with deep-sea reversing thermometers, as were those recorded in Volumes 1 and 2. No duplicate temperature readings were taken, so that an accuracy of $\pm 0.015^{\circ}\text{C}$., as determined by duplicate readings on *Warreen* data (Vol. 2), can probably be assumed correct.

(ii) *Salinity*.—The procedure recorded in Volumes 1 and 2 was followed.

(iii) *Depth*.—All depths are corrected depths using unprotected thermometers according to the method originally developed by Schumacher (1923).

The method of calculation used by Wust (1933) in the thermometric estimation of depths on the *Meteor* expedition has been followed.

(iv) *Phosphate P.*—Phosphates were determined by the method given in Volume 2, except that, as no laboratory space was available, all analyses were carried out in the Perth laboratory, using a Spekker absorptiometer with 4-cm. cells and the Ilford 608 filters.

(v) *Nitrate N.*—Nitrates were determined by the method given in Volume 2. As with the phosphates, all analyses were carried out in the Perth laboratory, using a Spekker absorptiometer with 1-cm. cells and the Ilford 602 filters.

(vi) *Hydrogen Ion.*—The pH determinations were made in the Perth laboratory on samples preserved with mercuric chloride according to the method of Ibáñez (1930). A Cambridge glass electrode pH meter was employed.

(vii) *Dissolved Oxygen.*—The method recorded in Volume 2 was followed.

III. PLANKTOLOGICAL OBSERVATIONS

In the earlier work done by F.R.V. *Warreen* in south-eastern Australian waters (Vols. 1, 2) the plankton programme was closely associated with the hydrological stations, but during the period covered by the present station list plankton hauls were frequently taken at stations not on the oceanographical section lines at which hydrological observations were made.

The following notes refer to each of the columns of planktological observations:

(i) *Type of Gear.*—N70 "Discovery"-type nets were used throughout the investigations. The following abbreviations have been used:

V = Vertical haul,
O = Oblique haul,
H = Horizontal haul.

(ii) *Depth.*—The depth is expressed in metres. Details are given of the depth of oblique hauls and the sections covered in vertical hauls.

(iii) *Duration.*—The duration of horizontal hauls is given in minutes.

(iv) *Volume.*—The hauls were preserved in formalin and upon their receipt at Cronulla the volume was determined.

(v) *Dominant Organism (D.O.).*—As the catches were being studied a note was made of the animal group or groups which, from visual inspection, were obviously predominant. The following abbreviations have been used:

C = Crustacea,
Cp = Copepoda,
Ch = Chaetognatha,

Co = Coelenterata,
F = Fish eggs and larvae,
M = Mollusca,
T = Tunicata (Thaliaceae, Copelata),
D = Diatoms.

(vi) *Counts*.—In Volumes 1 and 2, dealing with the results obtained by F.R.V. *Warreen* in south-eastern Australian waters, counts were shown for certain organisms occurring in the plankton catches. This practice was discontinued in Volume 3.

IV. PERSONNEL

The collection and analysis of the hydrological material in this volume have been the responsibility of Mr. R. Spencer, the hydrologist, assisted by Mr. A. Middleton, the Technical Officer (hydrologist), both stationed at Perth.

The depth calculations were carried out at Cronulla but all other transformations and calculations have been under Mr. Spencer's direction.

The plankton hauls were made on the vessel by Mr. Bruce Shipway, Sea-going Technical Officer. The material was all handled at Cronulla, where volumes and dominant organisms were determined by Miss Patricia Kott, assisted by Miss Marcia Whitehurst.

Certain pelagic Tunicates, fish eggs and larvae, and Chaetognaths have been removed from one-tenth portions of the collections. These are being studied respectively by Dr. H. Thompson, Mr. I. S. R. Munro, and Mr. J. M. Thomson.

V. REFERENCES

- IBANEZ, O. G. (1930).—On the colorimetric determination of pH in sea water. *J. Mar. Biol. Ass. U.K.* 17 (2): 483-8.
- SCHUMACHER, A. (1923).—Neue Hilfstafeln für die Umkippthermometer nach Richter und Beiträge zur thermometrischen Tiefenmessung. *Ann. Hydrogr., Berl.*: 273-80.
- WUST, G. (1933).—Thermometric measurement of depth. *Hydrogr. Rev.* 10 (2): 28-49.

R.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl ^o /oo	S ^o /oo	σ _t
1947								
5. ii	1/47	39° 43' S. 119° 21' E.						
19. iv	2/47	35° 45' S. 136° 45' E.						
5. v	3/47	37° 15' S. 135° 10' E.						
7. v	4/47	31° 37' S. 129° 45' E.						
8. v	5/47	31° 55' 30" S. 128° 41' E.						
9. v	6/47	20° 25' S. 126° 30' E.						
10. v	7/47	33° 4' S. 124° 15' E.						
11. v	8/47	34° 59' 30" S. 128° 20' E.						
13. v	9/47	33° 58' S. 122° 32' E.						
20. v	10/47	34° 00' S. 119° 45' E.						
21. v	11/47	34° 59' S. 118° 20' E.						
11. vii	12/47	34° 00' S. 122° 22' E.						
16. vii	13/47	33° 42' S. 123° 48' E.						
	14/47	34° 2' S. 123° 22' E.						

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HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ /d	pH	PO ₄ -P	NO ₃ -N	Net	Depth (m.)	Duration (min.)	Volume (cc.)	O ₂	Count			
										I	II	III	IV
					N70	H	20	2	Op				
					N70	H	15	95	Op				
					N70	H	30	38					
					N70	H	30	10	Op				
					N70	H	15	43	Op				
					N70	H	30	28	Op				
					N70	H	20	55	Op				
					N70	H	30	26	Op				
					N70	H	30	40	Op				
					N70	H	30		Op				
					N70	H	30	38	Op				
					N70	H	30	31	Op				
					N70	H	30	36	Op				
					N70	H	30	25	Op				

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl ^o /oo	S ^o /oo	σ _t
1947								
17. vii	15/47	33° 5' S. 124° 26' E.						
18. vii	16/47	33° 5' S. 124° 40' E.						
19. vii	17/47	33° 2' S. 124° 15' E.						
	18/47	33° 7' S. 124° 26' E.						
22. vii	19/47	33° 48' S. 124° 5' E.						
23. vii	20/47	33° 58' S. 123° 29' E.						
27. vii	21/47	34° 20' S. 119° 56' E.						
28. vii	22/47	35° 3' S. 116° 29' E.						
24. ix	23/47	29° 10' S. 114° 40' E.						
25. ix	24/47	26° 41' S. 113° 27' E.						
26. ix	25/47	24° 18' S. 113° 21' E.						
11. x	26/47	22° 4' S. 113° 37' E.						
13. x	27/47	21° 31' S. 114° 42' E.						
14. x	28/47	21° 31' S. 115° 1' E.						

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HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	NO ₃ -N	Net.	Depth (m.)	Duration (min.)	Volume (cc.)	D. D.	Count			
										I	II	III	IV
					N70	H	30	10	Cp				
					N70	H	30	25	Cp				
					N70	H	30		Cp				
					N70	H	30	55	C				
					N70	H	30	22	D				
					N70	H	30		Cp				
					N70	H	30	21	Cp				
					N70	H	30	125	Ch				
					N70	H	30	14	D				
					N70	H	30	20	Cp				
					N70	H	30	15	D				
					N70	H	30	68	Ch				
					N70	H		24	Ch				
					N70	H	30	13	Ch				

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Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/∞	S°/∞	σ _t
1947								
15.x	29/47	21° 52' S. 114° 13' E.						
	30/47	21° 52' S. 114° 32' E.						
17.x	31/47	21° 47' S. 114° 11' 30" E.						
23.x	32/47	26° 27' S. 113° 44' E.						
26.x	33/47	25° 35' S. 113° 21' E.						
1.xi	34/47	25° 22' S. 112° 58' E.						
9.xi	35/47	32° 3' S. 114° 17' E.		0	19.40	19.77	35.71	25.47
				20	19.40	.77	.71	.47
				50	19.25	.76	.70	.50
				100	18.19	.86	.88	.91
				150	17.18	.82	.81	26.10
				200	15.85	.82	.81	.42
				300	15.82	.85	.86	.46
				500	15.90	.83	.82	.42
				700	14.12	.78	.73	.74
	36/47	32° 3' S. 113° 30' E.		0	19.48	19.72	35.62	25.39
				20	19.50	.75	.68	.42
				50	17.61	.87	.90	26.04
				100	15.98	.82	.81	.38
				150	14.94	.72	.62	.48
				200	13.85	.67	.53	.65
				300	12.02	.52	.26	.81
				500	9.34	.26	34.79	.92
				700	8.18	.17	.63	.97
10.xi	37/47	32° 00' S. 119° 51' E.						

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	Z NO ₃	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count			
										I	II	III	IV
					N70	H	30	20	Cr				
					N70	H 10	30	40	Op				
					N70	H	30	128	Op				
					N70	H	30	1	F				
					N70	H	30	10	F				
					N70	H	30	40	D				
5.31	99		2	22									
.37	100		0	6									
.37	100		0	8									
.33	97		2	25									
.44	98		3	20									
.39	94		5	34									
.33	98		2	17									
.39	94		3	36									
.55	94		3	25									
5.38	100		6	34									
.38	100		5	20									
.45	98		3	13									
.50	96		6	25									
.52	95		6	34									
.67	96		9	45									
.52	90		8	72									
.64	87		14	110									
.32	78		21	155									
					N70	H	30	2					

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl‰	S‰	σ_t
1947 10. xi	38/47	32° 3' S. 115° 5' E.	0	19.32	19.77	35.71	25.44	
			20	18.99	.77	.71	.58	
			50	18.51	.82	.81	.78	
			100	17.58	.86	.88	26.06	
			150	16.40	.87	.90	.36	
			200	15.25	.77	.71	.48	
			300	12.94	.57	.35	.69	
			500	9.00	.24	34.76	.94	
	700	6.98	.19	.67	27.18			
	39/47	32° 3' S. 115° 16' E.	0	19.58	19.74	35.66	25.39	
			20	19.52	.74	.66	.40	
			50	19.38	.75	.68	.45	
			100	18.24	.82	.81	.84	
	40/47	32° 3' S. 114° 53' 30" E.	0	18.41	19.79	35.75	25.76	
			20	18.30	.79	.75	.79	
			50	17.81	.79	.75	.90	
			100	16.22	.83	.82	26.35	
			150	15.09	.78	.73	.49	
			200	13.91	.68	.55	.64	
			300	12.01	.48	.19	.75	
			500	9.32	.24	34.76	.89	
	700	7.60	.14	.58	27.02			
	41/47	32° 3' S. 114° 41' E.	0	18.28	19.79	35.75	25.79	
			20	18.31	.80	.77	.80	
50			18.11	.80	.77	.85		
100			16.62	.84	.84	26.26		
150			15.45	.79	.75	.46		
200			14.52	.69	.57	.53		
300			12.22	.49	.21	.73		
500			10.05	.30	34.87	.86		
700	8.90	.18	.65	.87				
22. xi	42/47	33° 20' S. 115° 16' E.						
23. xi	43/47	33° 31' S. 115° 16' E.						

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	Z O ₂ Z	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count				
										I	II	III	IV	
5.38	100		2	13										
.42	100		2	20										
.35	98		2	28										
.42	98		2	17										
.39	95		2	25										
.47	95		2	22										
.61	93		6	40										
.44	83		22	140										
4.91	72		32	175										
5.31	99		2	0										
.31	99		2	25										
.36	99		2	0										
.35	98		3	25										
5.47	100		0	3										
.47	100		0	6										
.52	100		0	25										
.52	97		5	20										
.50	95		6	34										
.61	95		6	42										
.67	92		10	92										
.55	85		40	230										
.07	75		36	195										
5.42	99		3	20										
.47	100		4	25										
.52	101		3	25										
.47	97		3	28										
.61	97		9	48										
.50	94		9	58										
.61	92		13	82										
.69	89		14	100										
.47	83		29	155										
					N70	H	30	40	Op					
					N70	H	30		F					

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ_t
1947								
24. xi	44/47	33° 25' S. 115° 11' E.						
25. xi	45/47	33° 14' S. 115° 3' E.						
27. xi	46/47	33° 31' S. 115° 10' E.						
1. xii	47/47	33° 38' S. 115° 00' E.						
2. xii	48/47	34° 38' S. 114° 50' E.						
4. xii	49/47	33° 56' S. 114° 43' E.						
7. xii	50/47	33° 23' S. 114° 51' E.						
8. xii	51/47	33° 25' S. 115° 18' E.						
	52/47	33° 32' S. 115° 2' 30" E.						
10. xii	53/47	33° 34' S. 115° 7' 30" E.						
11. xii	54/47	33° 22' S. 115° 28' E.						
13. xii	55/47	32° 24' S. 115° 23' E.						
	56/47	32° 53' S. 115° 15' E.						
14. xii	57/47	32° 10' S. 115° 30' E.						

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HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	NO ₃ -N	Net	Depth (m.)	Duration (min.)	Volume (cc.)	O ₂	Count				
										I	II	III	IV	
					N70	V 40-0			Op					
					N70	H	30	3	Op					
					N70	V 33-0		1						
					N70	H	30	4	F					
					N70	H	30	12	Op					
					N70	H	30	4	Op					
					N70	H	30	60	Op					
					N70	H	30	7	T					
					N70	H	30	14	Op					
					N70	H	30	8	C					
					N70	H	30	19	Op					
					N70	H	30	1	F					
					N70	H	30	20	Op					
					N70	H	30	48	Op					
					N70	H	30	10	C					
					N70	H	30	4	Op					

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS						
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ _t		
1948										
15. iv	1/48	32° 3' S. 115° 16' E.	0	21.84	19.68	35.55	24.73			
			20	21.12	.69	.57	.91			
			50	21.24	.71	.61	.91			
			100	22.48	.73	.64	.59			
			150	22.40	.77	.71	.66			
	2/48	32° 3' S. 115° 5' E.	0	22.39	19.68	35.55	24.54			
			20	22.87	.68	.55	.40			
			50	22.83	.68	.55	.42			
			100	22.14	.76	.70	.73			
			150	22.00	.80	.77	.82			
			200	18.79	.86	.88	25.76			
			300	14.42	.69	.57	26.56			
			500	9.29	.27	34.81	.95			
			16. iv	3/48	32° 3' S. 114° 53' 30" E.	0	22.84	19.66	35.52	24.39
						20	22.69	.68	.55	.46
50	22.89	.67				.53	.39			
100	22.04	.72				.62	.70			
150	20.30	.77				.71	25.24			
4/48	32° 3' S. 114° 17' E.	200		19.09	.85	.86	.67			
		300		14.28	.67	.53	26.56			
		500		9.29	.24	34.76	.90			
		800		6.63	.10	.51	27.10			
		0		21.51	19.80	35.77	24.96			
		20		22.38	.80	.77	.71			
		50		21.71	.81	.79	.91			
		100		19.40	.83	.82	25.56			
		150		16.94	.81	.79	26.15			
		200		16.11	.79	.75	.32			
300	13.25	.58	.37	.65						
500	8.62	.22	34.72	.98						
800	4.49	.06	.43	27.30						

F.R.V. Warreen

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	Z NO ₃	Net	Depth (m.)	Duration (min.)	Volume (cc.)	O ₂	Count			
										I	II	III	IV
5.06	98		0	0	N70	V 100-0		20	Ch				
4.90	93		3	0									
5.03	96		2	0									
.00	98		1	0									
.00	97		0	0									
4.81	94		6	0	N70	0 100-0		60	Ch				
5.04	99		2	0									
.05	99		0	0									
4.79	93		1	12									
			7	12									
.66	86		7	0									
5.54	94		8	20									
.44	83		28	220									
5.03	99		3	0	N70	0 100-0		22	Ch				
.10	99		4	3									
4.98	97		8	3									
5.06	98		6	0									
4.98	94		3	6									
5.45	101		1	3									
.45	93		13	33									
.53	85		33	122									
4.66	68		30	265									
5.00	96		4	3	N70	0 100-0		8	Ch				
.03	98		1	0									
.01	97		1	0									
.06	94		8	0									
.36	96		3	3									
.27	92		8	15									
.25	88		13	54									
.25	79		30	265									
4.28	59		42	455									

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ_t
1948								
16. iv	5/48	32° 3' S. 114° 41' E.		0	23.27	19.66	35.52	24.26
				20	23.01	.63	.46	.30
				50	23.17	.70	.59	.35
				100	20.86	.79	.75	25.12
				150	17.78	.83	.82	.97
				200	16.36	.77	.71	26.23
				300	16.08	.73	.64	.24
				500	9.47	.23	34.74	.86
				800	5.62	.10	.51	27.23
17. iv	6/48	32° 3' S. 113° 30' E.		0	20.32	19.86	35.88	25.36
				20	19.99	.85	.86	.44
				50	20.27	.86	.88	.37
				100	18.13	.86	.88	.93
				150	16.41	.78	.73	.86
				200	13.95	.57	.35	26.49
				300	11.55	.50	.23	.87
				500	9.20	.25	34.78	.93
				800	6.44	.09	.49	27.11
22. iv	7/48	32° 36' S. 115° 27' E.						
25. iv	8/48	33° 25' 30" S. 115° 20' E.						
	9/48	33° 27' S. 115° 16' E.						
26. iv	10/48	33° 24' S. 115° 23' E.						
	11/48	33° 18' S. 115° 17' E.						
28. iv	12/48	32° 27' S. 114° 58' E.						
1. v	13/48	33° 40' S. 114° 52' E.						

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	NO ₃ -N	Net	Depth (m.)	Duration (min.)	Volume (cc.)	O.D.	Count			
										I	II	III	IV
5.12	101		5	0	N70	0 100-0		6	Ch				
.13	101		1	0									
.31	105		3	0									
.46	104		0	3									
.27	95		3	3									
.55	83		6	18									
.51	97		8	26									
.72	88		28	185									
4.80	68		57	455									
5.21	98		5	3	N70	0 100-0		3	Cp				
.22	98		0	0									
.17	97		3	0									
.20	95		2	0									
.67	100		5	0									
.77	93		13	39									
.56	85		16	65									
4.74	68		27	220									
			57	340									
					N70	H	30	9	Cp				
					N70	H	15	30	Cp				
					N70	0 30-0		4	Cp				
					N70	H	15	11	Cp				
					N70	0 30-0		4	Cp				
					N70	H	15	45	T				
					N70	H	15	64	Ch				

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl ^o /oo	S ^o /oo	σ _t
1948								
6. v	14/48	36° 4' S. 118° 00' E.		0	18.77	19.80	35.77	25.43
				20	18.72	.78	.73	.67
				50	17.81	.77	.71	.88
				100	14.63	.63	.46	26.43
				150	14.80	.65	.50	.42
				200	13.77	.56	.34	.52
				300	11.86	.43	.10	.71
				500	9.36	.22	34.72	.86
				800	7.73	.16	.61	27.04
				1000	5.20	.10	.51	.28
	15/48	47° 00' S. 118° 00' E.		0	17.40	19.77	35.71	25.98
				20	17.32	.76	.70	.99
				50	16.32	.69	.57	26.13
				100	14.90	.55	.32	.25
				150	12.81	.43	.10	.53
				200	11.17	.37	34.99	.76
				300	9.94	.28	.83	.85
				500	9.01	.21	.70	.91
				800	8.43	.17	.63	.94
				1000	6.90	.11	.52	27.08
	16/48	35° 46' 45" S. 118° 00' E.		0	20.23	19.79	35.75	25.28
				20	20.79	.77	.71	.11
				50	19.30	.80	.77	.55
				100	18.87	.84	.84	.71
				150	15.91	.62	.44	26.12
				200	14.06	.60	.41	.51
				300	13.24	.56	.34	.62
				500	10.21	.31	34.88	.84
				800	8.64	.18	.65	.92
				1000	5.87	.12	.54	27.23

F.R.V. Warreen

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	Z NO ₃	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count				
										I	II	III	IV	
5.35	99		0	6	N70	0 100-0			4	Cp				
.26	97		2	3	N70	H	15	42		Cp				
.35	97		1	3										
.63	96		0	13										
.50	94		1	13										
.49	92		3	27										
.50	89		14	68										
.46	84		27	150										
.26	78		47	230										
4.68	66		57	350										
5.33	96		0	6	N70	0 100-0			2	Cp				
.35	96		0	3	N70	0 200-0			15	Cp				
.74	101		0	6	N70	H	15	5		Cp				
.81	100		6	19										
.89	97		12	58										
.96	95		17	105										
6.03	94		21	150										
.09	93		24	205										
5.74	86		28	260										
.09	74		47	295										
5.07	95		0	3	N70	0 100-0			6	Cp				
.09	98		0	3	N70	H	7	30		Cp				
.09	94		0	3										
.20	94		0	3										
.35	93		6	11										
.35	91		8	11										
.35	89		11	25										
.43	85		19	130										
.39	82		30	175										
4.91	70		39	230										

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl ^o /oo	S ^o /oo	σ _t
1948								
7.v	17/48	35° 36' 30" S. 118° 00' E.		0	20.99	19.75	35.68	25.02
				20	20.93	.76	.70	.06
				50	20.75	.79	.75	.15
				100	20.48	.75	.68	.16
				150	18.68	.84	.84	.62
				200	17.50	.72	.62	.89
				300	15.87	.76	.70	26.33
				500	12.30	.74	.66	27.06
				800	9.84	.49	.21	.17
				1000	9.00	.23	34.74	26.94
	18/48	35° 25' 30" S. 118° 00' E.		0	20.81	19.75	35.68	25.07
				20	20.79	.76	.70	.10
				50	20.81	.78	.73	.12
				100	20.76	.79	.75	.14
				150	20.76	.80	.77	.16
				200	19.75	.80	.77	.43
				300	13.07	.54	.30	26.63
				500	9.00	.22	34.72	.92
	19/48	35° 16' S. 118° 00' E.		0	20.49	19.76	35.70	25.18
				20	20.91	.77	.71	.08
				50	20.91	.75	.68	.05
14.v	20/48	34° 9' S. 119° 40' E.						
21.vi	21/48	34° 5' S. 123° 15' E.						
24.vi	22/48	33° 2' S. 124° 50' E.						
25.vi	23/48	33° 2' S. 124° 50' E.						
3.vii	24/48	34° 9' S. 120° 00' E.						

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	Z O ₂ Z	Net	Depth (m.)	Duration (min.)	Volume (cc.)	O. D.	Count			
										I	II	III	IV
5.07	97		1	6	N70	H	15	31	Cp				
.11	97		1	6									
.18	98		3	6									
.18	96		3	3									
.26	97		5	8									
.56	100		6	6									
.35	97		8	6									
.37	88		10	6									
.03	78		17	74									
.42	82		43	205									
4.98	94		0	6	N70	0 100-0		9	Φ				
5.16	98		2	6	N70	H	15	65	C				
.05	96		6	6									
4.95	94		6	3									
.98	94		6	6									
5.26	98		6	6									
.50	91		12	33									
.50	84		43	205									
5.05	95		2	6	N70	H	15	21	T				
.04	96		2	3									
.05	96		6	3									
					N70	H	15	6	Cp				
					N70	H	15	28	Cp				
					N70	H	15	40	Cp				
					N70	H	15	37	Cp				
					N70	H	15	51	D				

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ _t
1948								
23. viii	25/48	32° 3' S. 115° 16' E.		0	19.75	19.60	35.41	25.16
				20	19.79	.64	.48	.20
				50	19.62	.63	.46	.23
				100	19.39	.64	.48	.30
				150	18.21	.79	.75	.81
24. viii	26/48	32° 3' S. 115° 5' E.		0	20.13	19.63	35.46	25.10
				20	20.04	.63	.46	.12
				50	19.71	.64	.48	.22
				100	19.42	.63	.46	.28
				150	18.98	.81	.79	.64
				200	17.43	.76	.70	.96
				300	15.58	.74	.66	26.37
				500	10.04	.34	34.94	.92
	27/48	32° 3' S. 114° 53' 30" E.		0	20.91	19.60	35.41	24.85
				20	20.83	.61	.43	.88
				50	20.67	.64	.48	.96
				100	19.90	.69	.57	25.24
				150	17.93	.82	.81	.93
				200	17.54	.84	.84	26.07
				300	16.51	.81	.79	.25
				500	9.42	.27	34.81	.93
	28/48	32° 3' S. 114° 41' E.		0	20.86	19.60	35.41	24.86
				20	20.81	.63	.46	.91
				50	20.38	.64	.48	25.04
				100	19.64	.64	.48	.27
				150	18.22	.80	.77	.82
				200	17.41	.84	.84	26.07
				300	17.52	.80	.77	.00
				500	11.98	.48	.19	.76
				800	6.87	.23	34.74	27.26
				1000	4.34	.10	.51	.38

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	NO ₃ -N	Net	Depth (m.)	Duration (min.)	Volume (cc.)	O.D.	Count			
										I	II	III	IV
5.48	102		0	12	N70	0 100-0		2	Cp				
.48	102		0	4	N70	H	15	56	Cp				
.46	102		0	4									
.43	101		0	4									
.43	99		0	0									
5.51	103		2	8	N70	0 100-0		6	Cp				
.47	102		0	8	N70	H	15	55	Cp				
.52	103		0	8									
.43	101		0	12									
.45	101		3	20									
.77	104		6	12									
.61	98		4	20									
.98	93		20	158									
5.43	103		0	0	N70	0 100-0		6	Cp				
.42	103		0	0	N70	H	15	39	Cp				
.43	103		1	4									
.37	100		0	12									
.52	100		0	15									
.60	101		4	24									
.60	99		5	12									
6.00	92		21	140									
5.39	102		0	4	N70	0 100-0		3					
.39	102		0	8	N70	H	15	18					
.39	102		1	0									
.36	100		1	8									
.61	102		0	12									
.58	100		5	20									
.65	102		8	20									
.78	94		18	133									
.57	81		30	230									
4.65	64		53	390									

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS					
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ _t	
1948									
24. viii	29/48	32° 3' S. 114° 17' E.		0	20.85	19.60	35.41	24.86	
				20	20.77	.60	.41	.89	
				50	20.34	.61	.43	25.01	
				100	19.08	.76	.70	.55	
				150	17.35	.82	.81	26.07	
				200	15.94	.79	.75	.35	
				300	13.28	.62	.44	.69	
				500	10.13	.33	34.92	.88	
				800	8.62	.18	.65	.92	
				1000	6.67	.12	.54	27.12	
	30/48	32° 3' S. 113° 30' E.		0	17.97	19.79	35.75	25.87	
				20	17.95	.80	.77	.89	
				50	17.85	.82	.81	.94	
				100	17.79	.83	.82	.97	
				150	15.76	.76	.70	26.36	
				200	13.42	.57	.35	.60	
				300	11.15	.44	.12	.86	
				500	8.83	.26	34.79	27.00	
				800	5.63	.08	.47	.20	
				1000	3.95	.10	.51	.42	
25. viii	31/48	31° 4' S. 113° 2' E.							
26. viii	32/48	28° 48' S. 112° 16' E.		0	21.05	19.56	35.34	24.76	
				20	20.68	.57	.35	.87	
				50	20.61	.59	.39	.92	
				100	20.59	.61	.43	.94	
				150	17.87	.82	.81	25.94	
				200	17.39	.81	.79	26.04	
				300	17.31	.81	.79	.06	
				500	9.93	.41	.07	27.03	
				800	5.75	.08	34.47	.19	
				1000	4.43	.08	.47	.34	
28. viii	33/48	28° 47' 30" S. 114° 23' 30" E.							
	34/48	28° 47' 30" S. 114° 12' E.							

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	Σ O ₂ Z	Net	Depth (m.)	Duration (min.)	Volume (cca.)	O. D.	Count				
										I	II	III	IV	
5.43	103		0	39	N70	0 100-0			4	Cp				
.48	104		0	45	N70	H	15		8	Cp				
.49	103		0	45										
.51	102		1	28										
.61	101		0	32										
.67	99		9	28										
.90	98		15	57										
.90	92		18	92										
.66	85		32	210										
.03	73		44	278										
5.60	102		0	4	N70	0 100-0			3					
.58	101		0	12	N70	H			30	Cp				
.55	101		0	20										
.52	100		1	20										
.51	96		8	28										
.70	95		12	32										
.67	91		17	57										
.60	85		34	106										
4.79	68		48	196										
.48	61		53	230										
					N70	H	15		10	T				
5.43	103		7	28	N70	0 100-0			2	T				
.48	104		1	20	N70	H	15		11	T				
.45	103		0	20										
.41	102		0	20										
.56	101		0	15										
.52	99		1	12										
.57	100		0	12										
.83	91		18	70										
4.79	68		40	165										
3.98	55		54	195										
					N70	H	15		42	Cp				
					N70	H	15		10	Cp				

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS					
				Depth (m.)	Temp °C.	Cl°/∞	S°/∞	σ _t	
1948									
1. ix	35/48	28° 48' S. 113° 58' 30" E.		0	20.98	19.56	35.34	24.78	
				20	20.55	.55	.32	.87	
	36/48	28° 48' S. 113° 47' E.		0	20.68	19.53	35.28	24.81	
				20	21.26	.52	.26	.65	
				50	21.23	.54	.30	.68	
				100	21.23	.63	.46	.80	
				150	20.60	.71	.61	25.09	
				200	19.23	.82	.81	.60	
				300	13.00	.56	.34	26.67	
				500	8.39	.18	34.65	.96	
2. ix	37/48	28° 48' S. 113° 36' E.		0	20.03	19.56	35.34	25.03	
				20	20.02	.59	.39	.07	
				50	20.17	.64	.48	.10	
				100	19.99	.72	.62	.26	
				150	18.90	.81	.79	.66	
				200	18.82	.81	.79	.68	
	38/48	28° 48' S. 113° 24' 30" E.		300	12.24	.52	.26	26.77	
				500	8.96	.23	34.74	.94	
				800	5.02	.07	.45	27.25	
				0	20.14	19.64	35.48	25.10	
				20	19.52	.66	.52	.30	
				50	19.34	.75	.68	.46	
				100	18.29	.84	.84	.86	
				150	17.67	.81	.79	.97	
				200	16.95	.81	.79	26.14	
				300	12.43	.53	.28	.74	
				500	9.00	.28	34.83	27.00	
				800	5.34	.09	.49	.25	
	1000	4.21	.08	.47	.36				

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS														
O ₂	O ₂ %	pH	PO ₄ -P	Z O ₂ Z	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count									
										I	II	III	IV						
5.28	100		0	0															
.32	100		0	0															
5.07	96		0	12	N70	V 100-0					12	Cp							
.20	99		0	12	N70	H	35				48	Cp							
.20	99			15															
4.97	95		0	12															
5.03	95		0	12															
.03	93		2	8															
.41	90		9	32															
.41	81		32	108															
5.05	95		0	4	N70	V 100-0					6	T							
.38	101			8	N70	H	15				72	T							
.35	104		0	4															
.29	99		0	8															
.16	95		0	12															
.16	95		1	15															
.41	88		12	32															
.69	87		21	70															
4.54	63		54	180															
5.47	103		0	8	N70	V 100-0					6	T							
.37	100		0	15	N70	H	15				64	Cp							
.45	101		0	23															
.47	100		0	20															
.50	99		1	20															
.42	97		2	23															
.65	93		11	58															
.74	88		22	87															
4.73	67		44	180															
3.58	49		54	255															

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS					
				Depth (m.)	Temp °C.	Cl ^o /oo	S ^o /oo	σ _t	
1948									
2. ix	39/48	28° 48' S. 113° 2' E.		0	19.72	19.67	35.53	25.26	
				20	19.77	.75	.68	.35	
				50	18.95	.79	.75	.62	
				100	17.98	.82	.81	.91	
				150	17.13	.82	.81	26.12	
				200	15.51	.73	.64	.37	
				300	12.34	.51	.25	.73	
				500	9.16	.23	34.74	.91	
				800	5.32	.09	.49	27.25	
				1000	4.14	.11	.52	.41	
4. ix	40/48	25° 29' 30" S. 111° 10' E.		0	21.83	19.51	35.25	24.47	
				20	21.84	.49	.21	.45	
				50	21.46	.49	.21	.55	
				100	21.53	.61	.43	.69	
				150	20.70	.73	.64	25.08	
				200	18.47	.77	.71	.72	
				300	14.63	.66	.52	26.47	
				500	10.17	.30	34.87	.84	
				800	6.09	.12	.54	27.20	
				1000	4.38	.10	.51	.38	
	41/48	25° 29' 30" S. 111° 54' E.		0	22.00	19.51	35.25	24.42	
				20	21.97	.52	.26	.45	
				50	21.93	.49	.21	.42	
				100	21.31	.57	.35	.70	
				150	20.63	.68	.55	25.03	
				200	19.21	.81	.79	.43	
				300	14.72	.69	.57	26.49	
				500	9.29	.24	34.76	.90	
				800	5.05	.13	.56	27.34	
	42/48	25° 29' 30" S. 112° 47' 30" E.		0	20.95	19.54	35.30	24.75	
				20	21.37	.56	.34	.67	
				50	21.25	.53	.28	.65	
				100	21.18	.53	.28	.67	

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	Z O ₂	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count			
										I	II	III	IV
5.15	96		0	15	N70	V 100-0		4	Op				
4.88	91		0	23	N70	H	15	1	Op				
5.24	97		0	12									
.38	98		0	23									
.22	93		1	15									
.30	92		2	20									
.54	91		16	55									
.47	84		32	78									
4.47	63		44	136									
3.85	53		48	180									
5.30	102		0	32	N70	H	15	61	T				
.35	103		0	28									
.38	103		0	23									
.32	102		0	28									
.01	95		0	38									
.12	94		1	15									
.49	94		7	32									
.78	90		20	70									
4.95	71		40	130									
.47	62		59	195									
5.12	99		0	0	N70	H	45	6	Op				
.07	98		0	0									
.16	100		1	15									
.10	97		1	8									
4.64	88		1	20									
			5	0									
5.30	91		17	15									
			25	66									
3.88	54		53	130									
5.32	101		0	23	N70	V 100-0		1	Op				
.28	101		1	38									
.28	101		0	32									
.27	100		0	20									

F.R.V. Warren

Date	Station	Position	Sounding (athoms)	HYDROLOGICAL OBSERVATIONS					
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ _t	
1948									
4. ix	43/48	25° 29' 30" S. 112° 37' E.		0	21.50	19.52	35.26	24.58	
				20	21.46	.54	.30	.62	
				50	21.34	.54	.30	.65	
				100	21.32	.53	.28	.63	
	44/48	25° 29' 30" S. 112° 27' E.		0	22.00	19.52	35.26	24.44	
				20	21.92	.51	.25	.44	
				50	21.78	.49	.21	.46	
				100	21.67	.52	.26	.53	
	45/48	25° 29' 30" S. 112° 15' E.		0	22.13	19.46	35.16	24.31	
				20	21.97	.49	.21	.41	
				50	21.90	.50	.23	.44	
				100	21.88	.51	.25	.45	
				150	21.24	.63	.46	.80	
				200	20.33	.70	.59	25.14	
				300	14.87				
5. ix	46/48	25° 29' 30" S. 112° 47' 30" E.							
4. xi	47/48	31° 16' S. 115° 8' E.							
6. xi	48/48	28° 47' 30" S. 114° 12' E.							
13. xi	49/48	24° 4' S. 113° 11' E.							
4. xii	50/48	25° 29' 30" S. 112° 47' 30" E.		0	20.85	19.64	35.48	24.91	
				20	20.86	.65	.50	.93	
				50	20.05	.64	.48	25.13	
	51/48	25° 29' 30" S. 112° 37' E.		0	21.05	19.63	35.46	24.81	
				20	21.07	.63	.46	.81	
				50	21.00	.62	.44	.81	
				87	20.75	.63	.46	.91	

F.R.V. Warreen

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	Z NO ₃	Net	Depth (m.)	Duration (min.)	Volume (ccs.)	O D	Count			
										I	II	III	IV
5.32	102		1	23	N70	V 100-0		10	Cp				
.18	99		1	15	N70	H	15	105	Cp				
.20	99		0	0									
.18	99		6	0									
5.18	100		1	15	N70	V 100-0		5	Cp				
.23	101		1	23	N70	H	15	8	Cp				
.18	100		6	27									
.16	99		9	27									
5.03	96		2	15	N70	V 100-0		4	Cp				
.00	97		7	20	N70	H	15	8	T				
4.87	94		6	8									
5.12	99		6	20									
4.82	92		9	28									
			11	28									
5.23			13	23									
					N70	V 100-0		8	Cp				
					N70	H	15	53	Cp				
					N70	H	15	56	Cp				
					N70	H	15	10	Cp				
					N70	H	15	17	Cp				
5.49	104		0	0									
.46	104		1	5									
.49	103		0	0									
5.40	103		0	5									
.43	103		0	2									
.46	104		0	2									
.32	101		1	5									

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl ^o /oo	S ^o /oo	σ _t
1948								
4. xii	52/48	25° 29' 30" S. 112° 27' E.		0	21.30	19.61	35.43	24.75
				20	21.33	.64	.48	.78
				50	21.19	.65	.50	.84
				87	21.07	.64	.48	.85
	53/48	25° 29' 30" S. 112° 15' E.		0	21.31	19.61	35.43	24.75
				20	21.55	.60	.41	.67
				50	21.35	.61	.43	.73
				92	21.21	.61	.43	.78
				150	20.99	.64	.48	.88
	54/48	25° 29' 30" S. 111° 54' E.		0	22.26	19.51	35.25	24.35
				20	22.27	.53	.28	.37
				50	21.41	.61	.43	.72
			80	20.83	.60	.41	.87	
			150	19.79	.74	.66	25.34	
			200	18.47	.85	.86	.83	
			300	14.53	.62	.44	26.43	
			500	9.81	.35	34.96	.97	
			800	7.75	.31	.88	27.24	
5. xii			55/48	25° 29' 30" S. 111° 10' E.		0	21.81	19.58
		20			21.88	.59	.39	.57
		50			21.27	.66	.52	.83
		96			19.93	.69	.57	25.23
		145			19.29	.81	.79	.56
		190			17.99	.83	.82	.92
		290			14.29	.62	.44	26.48
		480			9.68	.32	34.90	.95
		760			5.80	.20	.69	27.35
		917			4.54	.15	.60	.43
9. xii	56/48	28° 47' 30" S. 114° 17' 30" E.						
	57/48	28° 47' 30" S. 114° 1' E.						

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	N NO ₃ -N	Net	Depth (m.)	Duration (min.)	Volume (ccs.)	D.O.	Count				
										I	II	III	IV	
5.52	105		0	2										
.49	105		1	2										
.43	104		0	5										
.43	103		0	5										
5.40	103		1	5										
.35	102		1	2										
.43	104		1	2										
.29	101		1	0										
.35	102		0	2										
.35	98		0	12										
5.43	105		1	5										
.29	103		0	2										
.49	106		0	5										
.25	100		5	5										
.15	96		1	0										
.18	95		0	5										
.21	89		2	36										
.75	89		44	165										
.52	82		59	215										
5.43	104		1	0										
.43	104		0	0										
.33	102		0	2										
.06	95		0	0										
.55	103		0	0										
.18	94		11	5										
.55	94		29	2										
.66	88		33	34										
3.75	54		44	155										
.53	49		85	455										
					N70	H		55	16	C				
					N70	H		15	4	F				

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS					
				Depth (m.)	Temp °C.	Cl ^o /oo	S ^o /oo	σ _t	
1948 9. xii	58/48	28° 48' S. 113° 58' 30" E.		0	20.85	19.75	35.68	25.06	
				20	20.81	19.73	.64	.05	
	59/48	28° 48' S. 113° 47' E.			0	20.85	19.73	35.64	25.04
					20	20.89	.70	.59	24.99
					50	20.82	.75	.68	25.07
					100	20.56	.74	.66	.13
					150	19.24	.88	.91	.67
					200	18.27	.95	36.04	26.01
	60/48	28° 48' S. 113° 36' E.			0	21.16	19.67	35.53	24.87
					20	21.09	.72	.62	.96
					50	20.40	.80	.77	25.26
					100	19.34	.81	.79	.55
					150	18.64	.85	.86	.79
					200	17.13	.85	.86	26.16
					300	14.59	.69	.57	.52
	61/48	28° 48' S. 113° 24' 30" E.			0	20.91	19.73	35.64	25.02
					20	20.86	.70	.59	.00
					50	20.85	.70	.59	.00
100					19.29	.72	.62	.44	
150					18.71	.82	.81	.73	
200					17.13	.83	.82	26.13	
300					14.19	.65	.50	.55	
500					9.87	.33	34.92	.93	
800					7.47	.16	.61	27.07	
1000					4.83	.18	.65	.43	
10. xii	62/48	28° 48' S. 113° 2' E.		0	21.06	19.70	35.59	24.94	
				20	21.14	.70	.59	.92	
				50	20.35	.73	.64	25.17	
				100	19.08	.83	.82	.65	
				150	17.58	.85	.86	26.05	
				200	15.95	.79	.75	.35	
				300	12.98	.58	.37	.71	
				500	9.57	.33	34.92	.98	
				800	5.91	.18	.65	27.30	
				1000	4.58	.26	.79	.51	

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	Z O ₂ Z	Net	Depth (m.)	Duration (min.)	Volume (ccs.)	O. D.	Count				
										I	II	III	IV	
5.25	100		0	5										
.54	105		1	2										
5.45	104		1	5										
.18	99		0	9										
.45	104		1	5										
.36	101		0	5										
.39	100		1	9										
.42	99		5	12										
5.45	104		0	0										
.39	103		1	0										
.05	96		1	5										
.48	102		1	2										
.51	103		3	12										
.25	94		3	12										
.65	97		7	30										
.65	89		28	135										
5.28	101		0	2										
.13	98		0	5										
.18	99		3	12										
.45	101		3	2										
.32	101		0	2										
.36	96		0	9										
.61	95		15	28										
.86	91		48	125										
.39	80		85	290										
4.54	63		85	335										
5.43	103		1	0										
.25	100		0	0										
.43	102		0	2										
.02	93		0	9										
.31	96		1	2										
.57	98		3	5										
.78	96		14	50										
.84	90		31	155										
4.91	71		65	290										
.01	56		85	335										

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS					
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ_t	
1948									
10. xii	63/48	28° 48' S. 112° 16' E.		0	20.21	19.85	35.86	25.38	
				20	20.13	.85	.86	.40	
				50	19.49	.82	.81	.53	
				100	18.07	.87	.90	.96	
				150	16.87	.82	.81	26.18	
				200	15.52	.75	.68	.39	
				300	12.71	.51	.25	.66	
				500	9.71	.29	34.85	.90	
				800	6.50	.09	.49	27.10	
				1000	4.27	.13	.56	.43	
11. xii	64/48	32° 3' S. 114° 17' E.		0	19.10	19.82	35.81	25.63	
				20	18.61	.81	.79	.73	
				50	17.09	.78	.73	26.07	
				104	14.93	.70	.59	.46	
				150	13.79	.60	.41	.57	
				200	12.66	.49	.21	.64	
				300	10.71	.40	.05	.88	
				485	8.93	.23	34.74	.95	
				780	4.78	.05	.42	27.25	
				970	3.80	.15	.60	.51	
	65/48	32° 3' S. 113° 30' E.		0	19.41	19.86	35.88	25.60	
				20	18.55	.86	.88	.82	
				50	18.14	.80	.77	.84	
				119	17.18	.79	.75	26.06	
				160	15.58	.72	.62	.34	
				200	13.94	.62	.44	.55	
				290	9.54	.23	34.74	.85	
				470	6.39	.11	.52	27.15	
				720	4.16	.10	.51	.40	
				910	3.76	.20	.69	.58	
12. xii	66/48	32° 3' S. 115° 16' E.		0	20.05	19.81	35.79	25.36	
				20	19.71	.78	.73	.42	
				50	19.41	.78	.73	.50	
				113	18.16	.76	.70	.78	
				144	17.76	.80	.77	.94	

F.R.V. Warreen

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	Z NO ₃ Z	Net	Depth (m.)	Duration (min.)	Volume (ccs.)	O D	Count				
										I	II	III	IV	
5.45	102		0	0	N70	V 100-0		1						
.48	102		1	2	N70	H	15	6	Cp					
.48	102		0	0										
.51	100		1	9										
.54	99		5	9										
.78	100		14	18										
.78	95		26	47										
.69	88		31	110										
4.98	73		75	260										
.29	59		75	335										
5.39	100		0	9	N70	V 100-0		1						
.59	103		0	2	N70	H	15	35	T					
.74	102		1	9										
.85	100		3	18										
.54	94		12	28										
.71	94		19	80										
.44	88		38	155										
.74	88		59	230										
4.33	60		85	550										
.26	58		85	550										
5.48	102		0	2	N70	V 100-0		4	Cp					
.66	105		1	9	N70	H	15	7	Cp					
.74	105		1	2										
.74	102		3	5										
.60	97		9	18										
.64	95		13	70										
.66	87		35	215										
4.82	70		59	335										
.44	60		75	455										
.12	56		85	455										
5.16	97		0	2	N70	V 100-0		1	Cp					
.38	100		2	9	N70	H	15	4	C					
.32	99		2	5										
.32	97		0	2										
.38	97		1	15										

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ _t
1948								
12. xii	67/48	32° 3' S. 115° 5' E.		0	19.94	19.81	35.79	25.39
				20	19.66	.83	.82	.50
				50	19.21	.76	.70	.52
				104	17.93	.80	.77	.90
				155	16.67	.76	.70	26.14
				205	15.69	.68	.55	.26
				310	13.08	.58	.37	.69
				510	8.82	.18	34.65	.89
	68/48	32° 3' S. 114° 53' 30" E.		0	20.05	19.78	35.73	25.33
				20	19.82	.81	.79	.42
				50	19.29	.80	.77	.55
				88	17.53	.82	.81	26.02
				140	14.35	.64	.48	.50
				200	12.93	.45	.14	.54
				320	11.03	.29	34.85	.67
				540	8.69	.14	.58	.86
	69/48	32° 3' S. 114° 41' E.		0	20.02	19.83	35.82	25.40
				20	19.72	.83	.82	.48
				50	17.99	.79	.75	.86
				110	15.93	.74	.66	26.29
				155	14.67	.66	.52	.46
				200	13.66	.61	.43	.60
				300	11.28	.41	.07	.79
				493	9.03	.25	34.78	.96
				800	5.25	.15	.60	27.35
				1000	4.14	.12	.54	.43
1949								
6. iv	1/49	32° 3' S. 115° 16' E.		0	23.99	19.63	35.46	24.01
				20	23.91	.65	.50	.07
				50	23.65	.65	.50	.14
				103	22.90	.69	.57	.42

F.R.V. Warreen

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	Σ NO ₃	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count			
										I	II	III	IV
5.32	100		1	5	N70	V 100-0		1	F				
.51	103		0	0	N70	H	15	5	F				
.45	101		0	5									
.48	100		0	2									
.51	99		0	2									
.58	97		2	12									
.67	94		11	58									
.54	85		24	192									
5.42	102		0	0	N70	V 100-0		1					
.42	102		1	0	N70	H	15	10	F				
.36	100		0	5									
.39	97		9	2									
.54	94		11	15									
.74	95		14	55									
.67	91		20	106									
.65	86		44	235									
5.16	97		0	5	N70	V 100-0		4	Cp				
.48	102		1	2	N70	H	15	25	Cp				
.57	101		1	0									
.67	99		1	0									
.74	98		9	18									
.51	92		11	40									
.57	89		21	97									
.57	85		41	165									
4.85	68		75	335									
.09	56		85	445									
4.95	99		3	2									
.92	98		4	3									
.97	98		7	3									
.62	91		13	117									

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/∞	S°/∞	σ _t
1949								
6.1v	2/49	32° 3' S. 115° 5' E.		0	23.71	19.65	35.50	24.13
				20	23.62	.65	.50	.15
				50	23.58	.66	.52	.17
				105	23.23	.68	.55	.30
				150	20.98	.75	.68	25.03
				190	18.99	.86	.88	.71
				275	14.86	.68	.55	26.45
				450	8.78	.25	34.78	27.00
7.1v	3/49	32° 3' S. 114° 53' 30" E.		0	24.03	19.62	35.44	23.98
				20	24.02	.64	.48	24.01
				50	23.18	.73	.64	.38
				91	21.83	.82	.81	.90
				140	19.27	.86	.88	25.63
				190	17.14	.85	.86	26.16
				280	16.09	.64	.48	.11
				475	9.33	.27	34.81	.94
				793	5.94	.15	.60	27.26
	4/49	32° 3' S. 114° 41' E.		0	23.06	19.74	35.66	24.44
				20	23.04	.74	.66	.44
				50	22.10	.79	.75	.77
				81	19.96	.87	.90	25.47
				140	17.06	.78	.73	26.08
				195	14.93	.75	.68	.52
				295	13.04	.58	.37	.69
				473	9.31	.30	34.87	.98
				790	5.46	.14	.58	27.31
				948	4.10	.10	.51	.41
	5/49	32° 3' S. 114° 17' E.		0	21.80	19.85	35.86	24.94
				20	21.80	.87	.90	.97
				50	20.15	.89	.93	25.45
				105	17.40	.84	.84	.57
				150	14.50	.63	.46	26.46
				200	12.80	.53	.28	.67
				297	10.92	.37	34.99	.80
				512	9.05	.21	.70	.90
				655	6.09	.15	.60	27.14
				752	7.15	.23	.74	.22

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	Σ NO ₃	Net	Depth (m.)	Duration (min.)	Volume (ccs.)	O. D.	Count			
										I	II	III	IV
5.06	100		8	0	N70	H	15	32	Cp				
.03	100		4	16									
4.98	99		0	0									
.87	97		2	0									
.99	95		8	0									
5.09	97		10	10									
.36	92		15	127									
.54	84		37	162									
4.83	97		3	0	N70	H	15	19	Cp				
.87	98		5	0									
5.03	100		3	0									
.11	99		4	0									
.11	95		6	0									
4.97	90		8	0									
5.30	93		9	0									
.63	87		27	80									
4.56	66		43	73									
5.00	99		3	0	N70	H	15	25	Cp				
.11	101		3	0									
.07	99		5	0									
.29	99		5	9									
.52	99		5	58									
.52	95		10	192									
.37	89		13	270									
.65	87		28										
4.75	68		38										
3.99	55		67										
5.23	101		6	2	N70	H	15	11	Cp				
.25	101		3	0									
.27	99		7	0									
.53	100		20	0									
.53	95		7	0									
.68	94		12	27									
.79	93		20	102									
.82	89		27	175									
4.84	79		27	180									
.97	73		33	110									

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/∞	S°/∞	σ _t
1949								
7.iv	6/49	32° 3' S. 113° 30' E.		0	21.76	19.89	35.93	25.02
				20	21.71	.88	.91	.01
				50	20.95	.88	.91	.22
				109	15.79	.73	.64	26.31
				150	14.56	.65	.50	.47
				200	13.09	.55	.32	.64
				300	11.34	.42	.08	.79
				479	9.39	.25	34.78	.90
				780	7.24	.15	.60	27.09
				970	4.46	.21	.70	.52
7.vi	7/49	32° 3' S. 113° 30' E.		0	20.35	19.78	35.73	25.25
				20	20.36	.78	.73	.24
				50	20.33	.81	.79	.29
				100	18.80	.84	.84	.73
				150	16.15	.76	.70	26.27
				200	14.50	.67	.53	.51
				300	11.77	.45	.14	.76
				511	9.29	.20	34.69	.84
				823	5.91	.07	.45	27.15
				1035	4.20	.06	.43	.34
	8/49	32° 3' S. 115° 16' E.		0	22.24	19.61	35.43	24.49
				20	22.22	.56	.34	.43
				50	22.26	.57	.35	.43
				99	22.11	.63	.46	.56
	9/49	32° 3' S. 115° 5' E.		0	22.16	19.56	35.34	24.45
				20	22.10	.57	.35	.48
				50	22.02	.61	.43	.55
				100	21.00	.75	.68	25.02
				129	20.85	.73	.64	.04
				155	20.43	.79	.75	.23
				210	19.13	.88	.91	.70
				264	18.88	.76	.70	.60

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	Z NO ₃	Net	Depth (m.)	Duration (min.)	Volume (ccs.)	O ₂ D	Count				
										I	II	III	IV	
5.32	103		5	0										
.32	103		7	0										
.39	103		4	0										
.82	101		4	0										
.70	98		5	0										
.57	93		18	38										
.90	95		22	73										
.86	90		24	105										
.09	75		43	195										
4.92	69		40	170										
5.52	104		0	0	N70	V 100-0		4	Cp					
.30	100		6	0	N70	H	15	17	Cp					
.28	100		10	0										
.54	102		9	0										
.28	93		18	0										
			14	0										
			18	52										
.75	88		39	170										
4.86	69		44	310										
.03	57		67	380										
5.08	99		0	0	N70	H	15	14	Cp					
.12	100		6	0										
			6	0										
4.97	96		4	0										
5.15	100		5	0	N70	V 100-0		6	Cp					
.18	100		3	0	N70	H	15	42	Cp					
.15	100		4	0										
.21	100		4	0										
4.89	93		3	0										
5.12	96		2	0										
.28	98		6	0										
4.93	90		5	0										

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/∞	S°/∞	σ _t
1949								
7. vi	10/49	32° 3' S. 114° 53' 30" E.		0	21.59	19.59	35.39	24.65
				22	21.30	.72	.62	.90
				53	20.55	.78	.73	25.19
				112	19.79	.86	.88	.50
				150	18.63	.88	.91	.83
				200	16.10	.77	.71	26.29
				300	12.14	.52	.26	.78
				500	9.45	.28	34.83	.91
				700	8.58	.25	.78	27.02
	11/49	32° 3' S. 114° 41' E.		0	20.95	19.73	35.64	25.01
				18	20.61	.74	.66	.12
				45	20.10	.83	.82	.38
				90	18.15	.84	.84	.89
				150	16.02	.78	.73	26.32
				195	14.45	.69	.57	.55
				295	11.95	.45	.14	.73
				495	9.30	.24	34.76	.90
				790	6.20	.10	.51	27.16
				961	4.19	.19	.67	.52
	12/49	32° 3' S. 114° 17' E.		0	20.42	19.80	35.77	25.26
				20	20.35	.80	.77	.28
				50	20.10	.81	.79	.35
				99	18.19	.82	.81	.86
				150	16.35	.76	.70	26.22
				200	14.15	.58	.37	.46
				297	11.75	.39	.03	.68
				495	9.29	.19	34.67	.83
				850	5.81	.06	.43	27.15
				1080	5.93	.06	.43	.13
18. vii	13/49	32° 3' S. 115° 16' E.		0	21.16	19.70	35.59	24.91
				20	21.14	.70	.59	.92
				50	21.15	.70	.59	.92
				97	21.16	.72	.62	.94
				130	21.05	.72	.62	.97

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	Z O ₃ Z	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count			
										I	II	III	IV
5.15	99		3	0	N70	V 100-0		10	Cp				
.10	98		6	0	N70	H	15	22	Co				
4.80	91		5	0									
5.15	96		4	0									
.28	97		8	0									
.54	97		8	4									
.52	90		19	63									
.80	89		27	175									
.51	83		31	185									
5.12	98		4	0	N70	V 100-0		4	Ch				
4.73	89		5	10									
5.12	98		3	0									
.21	95		6	0									
.21	91		9	0									
.15	88		9	15									
.61	91		16	82									
.57	86		30	200									
4.80	69		44	360									
.27	60		56	390									
5.15	98		4	0	N70	V 100-0		2	Cp				
.06	96		5	0	N70	H	15	2	T				
.15	98		31	4									
.28	96		9	0									
.45	96		13	0									
.48	93		34	8									
.57	90		4	95									
.80	89		36	270									
4.73	68		34	360									
5.35	102		2	0									
.17	99		3	0									
.28	101		2	0									
.24	100		0	0									
.15	99		0	0									

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/∞	S°/∞	σ _t
1949								
18. vii	14/49	32° 3' S. 115° 5' E.		0	20.96	19.77	35.71	25.04
				20	20.93	.75	.68	.06
				50	20.95			
				87	20.60	.77	.71	.16
				115	20.66	.76	.70	.13
				135	20.51	.72	.62	.12
				155	20.20	.72	.62	.20
				212	18.38	.83	.82	.82
22. vii	15/49	32° 3' S. 114° 53' 30" E.		0	19.18	19.77	35.71	25.53
				20	19.20	.78	.73	.55
				50	19.20	.80	.77	.58
				93	19.18	.87	.90	.68
				150	17.81	.90	.95	26.06
				200	15.68	.77	.71	.38
				295	12.03	.53	.28	.82
				481	8.73	.23	34.74	.98
				814	4.82	.04	.40	27.24
	16/49	32° 3' S. 114° 41' E.		0	18.63	19.80	35.77	25.72
				20	18.45	.80	.77	.77
				50	18.42	.80	.77	.78
				101	18.30	.82	.81	.83
				150	16.57	.82	.81	26.25
				200	14.29	.70	.59	.60
				300	9.96	.43	.10	27.06
				477	8.72	.31	34.88	.09
				790	4.69	.14	.58	.40
				974	3.86	.07	.45	.38
	17/49	32° 3' S. 114° 17' E.		0	18.60	19.50	35.23	25.73
				20	18.58	.82	.81	.76
				50	18.42	.87	.90	.87
				100	18.00	.85	.86	.95
				150	16.08	.77	.71	26.29
				200	14.11	.67	.53	.60
				300	10.71	.43	.10	.93
				502	8.48	.18	34.65	.94
				800	4.32	.14	.58	27.44
				1005	4.02	.18	.65	.52

F.R.V. Warreen

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	Z NO ₃ N	Net	Depth (m.)	Duration (min.)	Volume (ccs.)	D.O.	Count			
										I	II	III	IV
5.30	101		0	0									
.33	102		0	0									
.62			0	0									
.10	97		0	0									
.17	98		2	0									
.20	98		0	0									
.14	97		0	0									
.33	98		18	0									
5.54	102		0	0									
.54	102		0	0									
.55	102		0	0									
.43	101		5	0									
.54	100		10	0									
.51	96		10	9									
.80	94		12	98									
.90	90		16	305									
4.65	65		38	545									
5.65	104		0	0									
.70	104		0	0									
.65	103		3	0									
.60	102		0	0									
.65	100		0	14									
.73	97		12	37									
6.12	95		19	124									
.03	90		28	270									
4.90	68		38	535									
.25	58		55	545									
5.35	99		0	0									
.64	104		0	0									
.42	99		2	0									
.50	100		4	0									
.26	92		5	0									
.70	95		6	39									
.95	94		34	19									
.77	87		37	380									
4.55	63		50	481									
3.83	51		48	525									

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ _t
1949								
23. vii	18/49	32° 3' S. 113° 30' E.		0	19.98	19.72	35.62	25.26
				20	19.60	.75	.68	.40
				50	18.35	.82	.81	.82
				95	18.04	.82	.81	.90
				130	17.69	.87	.90	26.06
				175	15.93	.80	.77	.37
				250	13.76	.87	.90	.94
				415	10.56	.85	.86	27.54
9. xi	19/49	32° 3' S. 114° 17' E.		0	19.25	19.71	35.61	25.44
				21	19.25	.72	.62	.45
				52	18.98	.72	.62	.52
				104	18.22	.77	.71	.78
				153	17.24	.79	.75	26.03
				203	15.89	.74	.66	.30
				302	12.94	.51	.25	.61
				499	9.42	.24	34.76	.88
				801	6.67	.12	.54	27.13
				1002	4.31	.10	.51	.38
	20/49	32° 3' S. 113° 30' E.		0	18.95	19.74	35.66	25.56
				21	18.75	.74	.66	.61
				54	18.50	.75	.68	.68
				107	16.73	.73	.64	26.08
				159	14.47	.60	.41	.42
				210	12.71	.43	.10	.55
				314	11.09	.33	34.92	.71
				520	8.87	.14	.58	.82
				802	5.64	.05	.42	27.15
				990	3.83	.00	.33	.28
10. xi	21/49	32° 3' S. 115° 16' E.		0	20.78	19.66	35.52	24.96
				18	20.30	.67	.53	25.11
				45	19.98	.69	.57	.22
				91	19.44	.67	.53	.34

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	Z O ₂ Z	Net	Depth (m.)	Duration (min.)	Volume (cca.)	D.O.	Count				
										I	II	III	IV	
5.42	102		3	0										
.43	101		3	0										
.64	103		3	0										
.60	102		5	0										
.10	92		0	0										
.60	98		0	6										
.65	95		15	41										
.92	94		17	188										
5.60	104		3-24	0										
.65	105		2-11	0										
.67	105		1-11	0										
.70	104		3-10	0										
.60	100		3-25	0										
.59	98		6-13	0										
.79	96		13-4	60										
.98	92		20-10	238										
.23	76		23-18	465										
4.76	65		44-11	565										
5.73	106		3-10	0										
.76	106		4-8	0										
.76	106		3-6	0										
.60	100		5-7	0										
.73	98		10-2	8										
.90	98		13-7	36										
.98	95		17-6	115										
.95	90		25-9	238										
4.95	70		36-8	340										
.60	63		48-7	405										
5.56	105		5-9	0										
.57	104		4-5	0										
.40	101		3-3	0										
.60	104		4-2	0										

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS					
				Depth (m.)	Temp. °C.	Cl°/∞	S°/∞	σ _t	
1949									
10. xi	22/49	32° 3' S. 115° 5' E.		0	20.95	19.62	35.44	24.86	
				22	20.80	.59	.39	.86	
				54	20.58	.63	.46	.98	
				108	19.78	.71	.61	25.32	
				153	19.41	.86	.88	.60	
				197	19.33	.72	.62	.43	
				287	17.47	.76	.70	.95	
				465	9.54	.22	34.72	26.83	
	23/49	32° 3' S. 114° 53' 30" E.		0	20.71	19.65	35.50	24.97	
				20	20.68	.64	.48	.96	
				51	20.65	.65	.50	.99	
				101	18.84	.78	.73	25.64	
				140	18.44	.75	.68	.70	
				180	17.54	.79	.75	.97	
				261	15.70	.71	.61	26.30	
				421	10.60	.37	34.99	.86	
				694	6.27	.02	.36	27.03	
	24/49	32° 3' S. 114° 41' E.		0	19.26	19.68	35.55	25.39	
				22	19.26	.68	.55	.39	
				55	19.02	.69	.57	.47	
				110	17.61	.77	.71	.93	
				159	17.19	.78	.73	26.05	
				207	16.32	.74	.66	.20	
				305	13.77	.57	.35	.52	
				500	9.41	.24	34.76	.85	
				762	7.59	.16	.61	27.06	
				937	4.27	.04	.40	.30	
1950									
23. 11	1/50	32° 3' S. 115° 16' E.		0	22.59	19.67	35.53	24.48	
				17	22.53	.67	.53	.49	
				42	22.25	.67	.53	.55	
				84	21.98	.83	.82	.87	

F.R.V. Warreen

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	Z NO ₃	Net	Depth (m.)	Duration (min.)	Volume (ccs.)	D.O.	Count				
										I	II	III	IV	
5.36	102		2-10	4										
.49	105		2-8	6										
.45	102		4-1	0										
.35	100		4-6	0										
.35	100		5-3	0										
.15	96		4-5	0										
.40	97		4-6	0										
.95	92		23-4	710										
5.57	105		5-3	0										
.54	105		3-5	0										
.40	102		5-3	0										
.30	98		8-0	0										
.58	102		9-0	8										
.70	102		3-14	0										
.58	97		8-9	16										
.90	93		17-2	130										
.05	73		42-5	505										
5.65	104		1-9	0										
.64	104		3-7	0										
.65	104		3-3	0										
.60	101		3-27	0										
.60	100		6-24	0										
.65	100		3-28	0										
.80	98		9-10	20										
6.06	93		21-23	265										
5.52	82		27-17	405										
4.58	63		38-15	680										
5.26	102		7-0	0										
.26	102		9-0	0										
.26	102		5-1	0										
.26	102		6-0	0										

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS							
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ _t			
1950 23. 11	2/50	32° 3' S. 115° 5' E.		0	22.46	19.67	35.53	24.51			
				21	22.43	.67	.53	.52			
				53	22.43	.69	.57	.55			
				105	20.40	.70	.59	25.12			
				154	19.47	.75	.68	.43			
				203	17.41	.76	.70	.97			
				300	14.85	.55	.32	26.26			
				495	8.71	.14	34.58	.86			
				3/50	32° 3' S. 114° 53' 30" E.		0	22.59	19.71	35.61	24.54
						15	22.51	.70	.59	.54	
		47	22.42			.70	.59	.56			
		74	19.66			.80	.77	25.46			
		126	17.25			.72	.62	26.09			
		178	15.45			.67	.53	.30			
		281	12.33			.44	.12	.63			
		488	9.34			.17	34.63	.79			
		859	6.21			.01	.34	27.03			
	24. 11	4/50	32° 3' S. 114° 41' E.				0	22.19	19.71	35.61	24.65
					20	22.12	.71	.61	.67		
					51	21.92	.70	.59	.70		
				101	18.37	.72	.62	25.68			
				150	16.74	.71	.61	26.06			
				199	14.99	.62	.44	.33			
				297	11.71	.35	34.96	.63			
				493	8.84	.17	.63	.87			
				791	5.55	.03	.38	27.14			
				989	3.99	.04	.40	.33			
		5/50	32° 3' S. 114° 17' E.		0	22.02	19.74	35.66	24.73		
				21	21.95	.71	.61	.72			
				52	22.00	.74	.66	.74			
				103	18.75	.74	.66	25.61			
				150	17.18	.70	.59	.94			
				196	15.55	.61	.43	26.19			
				289	12.23	.37	34.99	.56			
				476	8.59	.17	.63	.91			
				795	4.23	.03	.38	27.29			
				1008	3.64	.09	.49	.43			

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	NO ₃ -N	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count				
										I	II	III	IV	
5.26	102		2-10	0										
.26	102		7- 2	0										
.26	102		7- 0	0										
.18	98		7- 0	0										
.30	98		10- 0	0										
.65	101		12- 0	0										
.67	97		19- 0	38										
.79	88		39- 0	200										
5.33	105		9- 1	0										
.26	102		5- 2	0										
.33	105		6- 0	0										
.57	104		8- 0	0										
.57	100		10- 0	0										
.67	99		16- 0	0										
.90	97		18- 0	78										
.88	91		37- 0	290										
4.67	68		56- 0	370										
5.15	100		6- 0	0										
.13	100		7- 0	0										
.19	100		7- 1	0										
.30	97		10- 0	0										
.48	97		8- 0	0										
.51	95		10- 0	10										
.80	94		17- 0	75										
.80	88		30- 0	200										
4.77	66		49- 0	410										
.37	60		62- 0	167										
5.15	100		4- 0	0										
.19	100		7- 0	0										
.15	100		7- 0	0										
.44	100		10- 0	0										
.41	96		12- 0	0										
.66	98		14- 0	0										
.85	96		20- 0	68										
.80	88		40- 0	253										
4.66	64		60- 0	545										
.34	59		64- 0	445										

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/∞	S°/∞	σ _t
1950								
24. 11	6/50	32° 3' S. 113° 30' E.		0	21.70	19.70	35.59	24.77
				22	21.54	.73	.64	.85
				54	20.17	.71	.61	25.17
				109	18.56	.74	.66	.67
				149	18.18	.73	.64	.72
				184	17.73	.73	.64	.83
				269	14.79	.62	.44	26.37
				430	10.19	.32	34.90	.86
				630	8.79	.19	.67	.91
				762	7.14	.20	.69	27.17
21. vi	7/50	32° 3' S. 114° 41' E.		0	20.85	19.76	35.70	25.08
				19	20.80	.74	.66	.07
				46	20.80	.77	.71	.11
				93	20.18	.84	.84	.37
				104	20.91	.76	.70	.07
				112	20.83	.76	.70	.09
				132	19.90	.85	.86	.46
				171	18.97	.85	.86	.70
	8/50	32° 3' S. 114° 17' E.		0	21.56	19.68	35.55	24.78
				20	21.49	.71	.61	.84
				49	21.10	.80	.77	25.07
				99	19.81	.86	.88	.49
				140	19.30	.86	.88	.63
				182	18.05	.82	.81	.90
				265	14.35	.69	.57	26.57
				431	9.78	.37	34.99	27.00
				676	8.19	.20	.69	.01
				840	5.62	.27	.81	.48
	9/50	32° 3' S. 113° 30' E.		0	21.35	19.70	35.59	24.86
				20	21.30	.67	.53	.84
				51	21.25	.67	.53	.85
				101	19.94	.88	.91	25.49
				140	19.61	.83	.82	.51
				180	19.53	.90	.95	.62
				258	16.33	.74	.66	26.20
				416	10.88	.44	.12	.91
				654	8.78	.26	34.79	27.01
				812	7.17	.40	35.05	.45

F.R.V. Warreen

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS								
O ₂	O ₂ %	pH	PO ₄ -P	Z O ₂ Z	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count			
										I	II	III	IV
5.27	102		6-0	0									
.23	101		6-0	0									
.27	99		5-6	0									
.23	96		8-0	0									
.27	96		8-0	0									
.36	95		10-0	0									
.55	95		10-0	7									
.80	90		25-0	120									
.69	86		32-0	158									
.21	77		33-0	146									
5.25	100	8.18	6-7	0									
.25	100	.17	8-2	0									
.24	100	.16	8-0	0									
.35	101	.16	8-1	0									
.19	99	.18	6-4	0									
.19	99	.16	3-4	0									
.22	98	.15	7-6	0									
.34	99	.17	7-6	0									
5.34	103	8.14	2-10	0									
.05	97	.20	11-2	0									
4.90	91	.20	7-9	0									
5.09	87	.13	0-12	0									
.30	99	.17	5-10	0									
.34	97	.18	11-4	0									
.53	92	.15	8-5	17									
.67	88	.14	25-0	197									
.57	83	.08	34-0	350									
4.87	70	.07	40-0	440									
5.15	99	8.22	7-3	0									
.15	99	.22	2-7	0									
.10	98	.21	0-8	0									
.12	96	.17	12-	0									
.25	98	.20	9-0	0									
.35	100	.17	2-6	0									
.53	97	.20	2-9	10									
.85	93	.15	17-0	136									
.70	87	.09	23-7	280									
.28	76	.11	28-7	120									

F.R.V. Warreen

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS					
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ_t	
1950	22. vi 10/50	32° 3' S. 115° 16' E.		0	21.28	19.68	35.55	24.85	
				17	21.28	.66	.52	.82	
				43	21.30	.66	.52	.82	
				87	21.36	.68	.55	.81	
	11/50	32° 3' S. 115° 5' E.		0	21.46	19.65	35.50	24.76	
				18	21.38	.64	.48	.77	
				44	21.41	.60	.41	.71	
				89	21.38	.72	.62	.88	
				143	21.51	.71	.61	.83	
				197	21.33	.72	.62	.89	
				304	18.72	.86	.88	25.77	
				519	10.71	.46	.16	26.97	
	12/50	32° 3' S. 114° 53' 30" E.		0	21.19	19.65	35.50	24.84	
				21	21.09	.71	.61	.96	
				52	21.16	.71	.61	.93	
				103	21.16	.71	.61	.93	
				139	21.11	.76	.70	25.01	
				171	20.03	.84	.84	.41	
				236	18.02	.84	.84	.92	
				365	11.24	.51	.25	26.94	
				543	8.31	.37	34.99	27.24	
			5. x	13/50	32° 3' S. 115° 16' E.		0	19.62	19.64
		22				19.41	.63	.46	.29
		55				19.51	.66	.52	.30
	109	19.30				.60	.41	.28	
14/50	32° 3' S. 115° 5' E.			0	19.62	19.65	35.50	25.26	
				22	19.63	.65	.50	.26	
				55	19.60	.64	.48	.25	
				110	19.60	.63	.46	.24	
				175	19.51	.68	.55	.33	
				239	19.10	.76	.70	.55	
				368	18.53	.75	.68	.60	
				627	12.51	.24	34.76	26.32	

F.R.V. Warreen

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	Z NO ₃ -N	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count				
										I	II	III	IV	
5.06	97	8.11	2-3	0										
.06	97	.16	2-6	0										
.06	97	.14	6-17	0										
.06	97	.17	6-9	0										
5.06	97	8.17	10-0	0										
.10	98	.15	0-9	0										
.15	99	.17	6-11	0										
.10	98	.15	3-4	0										
4.90	96	.15	0-11	0										
.87	94	.14	0-12	0										
5.30	98	.13	0-8	0										
.75	91	.12	17-4	61										
5.10	98	8.17	12-0	0										
.20	99	.18	6-0	0										
.25	100	.16	7-0	0										
.15	98	.16	7-0	0										
.15	98	.16	7	0										
.15	97	.16	10-0	0										
.46	99	.10	7-6	0										
.78	93	.09	21-0	68										
.65	85	.11	21-11	185										
5.45	102	8.28	4-3	0										
.37	100	.29	1-8	0										
.34	100	.28	7-10	0										
.25	97	.28	3-15	0										
5.45	102	8.31	4-1	0										
.48	103	.31	5-7	0										
.37	100	.30	6-15	0										
.35	100	.30	3-5	0										
.31	99	.31	6-22	0										
.37	99	.31	4-21	0										
.57	102	.25	8-13	0										
.70	93	.15	21-14	360										

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ _t
1950								
5.x	15/50	32° 3' S. 114° 53' 30" E		0	19.61	19.66	35.52	25.27
				17	19.53	.66	.52	.29
				43	19.61	.66	.52	.27
				87	19.61	.64	.48	.24
				156	19.21	.73	.64	.47
				224	17.77	.76	.70	.88
				363	12.03	.54	.30	26.84
				640	11.52	.45	.14	.81
				1040	7.99			
6.x	16/50	32° 3' S. 114° 41' E.		0	19.74	19.64	35.48	25.21
				23	19.75	.62	.44	.18
				59	19.71			
				114	19.75	.66	.52	.23
				161	19.00	.77	.71	.58
				208	17.93	.72	.62	.79
				302	15.56	.81	.79	26.47
				488	9.49	.29	34.85	.93
				778	5.65	.09	.49	27.21
				972	4.14	.18	.65	.51
	17/50	32° 3' S. 114° 17' E.		0	19.31	19.68	35.55	25.38
				19	19.31	.67	.53	.37
				48	18.60	.74	.66	.64
				96	18.50	.80	.77	.76
				147	17.70	.83	.82	26.19
				199	16.25	.75	.68	.23
				301	13.15	.50	.23	.56
				507	9.11	.27	34.81	.98
				805	5.77	.07	.45	27.16
				1004	3.85	.07	.45	.38

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	NO ₃ -N	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count				
										I	II	III	IV	
5.33	99	8.33	2-9	0										
.38	100	.31	6-0	0										
.33	100	.32	3-8	0										
4.52	85	.32	4-6	0										
3.22	60	.32	0-9	0										
.33	60	.30	6-6	0										
.08	50	.25	12-9	48										
.64	58	.29	10-4	95										
5.36	100	8.26	1-12	0										
.36	100	.26	4-7	0										
.33	98	.24	0-13	0										
.10	95	.24	3-8	0										
.50	100	.19	3-7	0										
.50	96	.21	4-5	0										
.78	89	.11	10-2	265										
4.76	67	.00	36-7	940										
.49	62	.05	36	765										
5.39	100	8.30	0-10	0										
.39	100	.29	3-3	0										
.40	97	.32	2-11	0										
.30	98	.31	3-7	0										
.30	95	.31	1-3	0										
.55	98	.30	4-0	0										
3.96	66	.27	8-0	55										
5.58	85	.22	18	290										
4.50	64	.09	28	655										
.76	64	.10	35	675										

F.R.V. Warren

Date	Station	Position	Sounding (fathoms)	HYDROLOGICAL OBSERVATIONS				
				Depth (m.)	Temp °C.	Cl°/oo	S°/oo	σ_t
1950								
6.x	18/50	32° 3' S. 113° 30' E.		0	18.10	19.77	35.71	25.81
				21	18.00	.75	.68	.81
				53	18.00	.75	.68	.81
				105	15.99	.73	.64	26.26
				157	14.78	.66	.52	.43
				208	12.95	.51	.25	.61
				311	10.23	.18	34.65	.65
				516	8.42	.14	.58	.90
				789	4.78	.12	.54	27.36
				970	3.77	.22	.72	.61

F.R.V. Warren

HYDROLOGICAL OBSERVATIONS					PLANKTOLOGICAL OBSERVATIONS									
O ₂	O ₂ %	pH	PO ₄ -P	NO ₃ -N	Net	Depth (m.)	Duration (min.)	Volume (cc.)	D.O.	Count				
										I	II	III	IV	
5.38	98	8.24	2-4	0										
.58	101	.21	3-3	0										
.61	101	.21	2-19	0										
.71	100	.19	3-10	0										
.58	96	.18	14-0	12										
.70	94	.14	8-0	48										
6.05	94	.11	18-0	500										
4.83	73	.09	39	830										
.83	67	.06	37	875										
.62	63	.10	23	415										