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Department of Oceanography
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Department of Oceanography
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PHYSICAL AND CHEMICAL OCEANOGRAPHIC DATA

UMPQUA RIVER ESTUARY

OREGON

Part I: December 14-15, 1960



by
Richard J. Callaway

UNITED STATES DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
Public Health Service
Water Supply and Pollution Control Program
Region IX, Portland, Oregon
January, 1961

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ABSTRACT

Oceanographic data collected in the Umpqua River Estuary, Oregon, during the period December 14-15, 1960, are tabulated. Temperature, salinity and velocity were measured from the surface to the bottom at approximately five-foot intervals at four stations in the estuary. Oxygen samples were collected at depth on four occasions.

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INTRODUCTION

As part of the U. S. Public Health Service's program of water supply and pollution control investigations in the Pacific Northwest, a monthly survey of oceanographical conditions in the Umpqua River Estuary, Oregon, began on December 14, 1960. The objectives of this oceanographical program have been described by Callaway (1960). Methods of data collection, tabulations of the data, and accuracy of the data are described below, although no physical interpretation is attempted.

STATIONS

The stations occupied are shown in Fig. 1. The station at Barrett's Landing was sampled hourly over a half-tidal cycle in order to determine (approximately) river runoff volume during the course of the survey.

DATA COLLECTED

Temperature: Temperature data were obtained using a Chesapeake Bay Institute conductivity-temperature indicator (Schiemer and Pritchard, 1957) on loan from the Oregon Fish Commission. The accuracy of these data should be about $\pm 0.1^{\circ}\text{C}$.

Salinity: Salinity data were obtained using the CBI conductivity-temperature indicator. The accuracy of these data should be about $\pm 0.1^{\circ}/\text{oo}$.

Dissolved Oxygen: The Alsterberg modification of the Winkler determination for dissolved oxygen was used. The accuracy of these data should be about ± 0.1 ppm. The analyses were made by chemists of the Oregon State Sanitary Authority in Portland, one to two days after the collection of the samples.

Velocity: The modified Jacobsen current drag described by Pritchard and Burt (1951) was used to determine velocity. These data should be accurate to ± 0.05 ft. per second.

TIDES

The predicted tidal curves for the Umpqua River entrance and Reedsport are shown in Fig. 2, for December 14-15, 1960.

PERSONNEL

In addition to the author, Messrs. Earl Kari and John Wilson, U. S. Public Health Service, Portland, and Mr. Glenn Carter, Oregon State Sanitary Authority, Portland, participated in the field work.

ACKNOWLEDGEMENTS

Dr. Wayne V. Burt, Department of Oceanography, Oregon State College, furnished equipment and the facilities of his laboratory. Dr. Burt and Mr. Bruce McAlister, Research Associate in Oceanography, have also provided valuable information and assistance in the establishment of this office's oceanography program.

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1960. Prospectus for an oceanographical investigation of the Umpqua River Estuary and related studies on the Umpqua River Basin. Mimeographed report, U. S. Public Health Service, Portland, Oregon.

Pritchard, D. W., and Burt, Wayne V.

1951. An inexpensive and rapid technique for obtaining current profiles in estuarine waters. Journal of Marine Research 10, 2, pp. 180-189.

Schiemer, W., and Pritchard, D. W.

1957. The Chesapeake Bay Institute conductivity-temperature indicator (CBI-CTI). The Johns Hopkins University, Chesapeake Bay Institute, Tech. Dept. XII, Ref. No. 57-1. (Unpublished manuscript.)

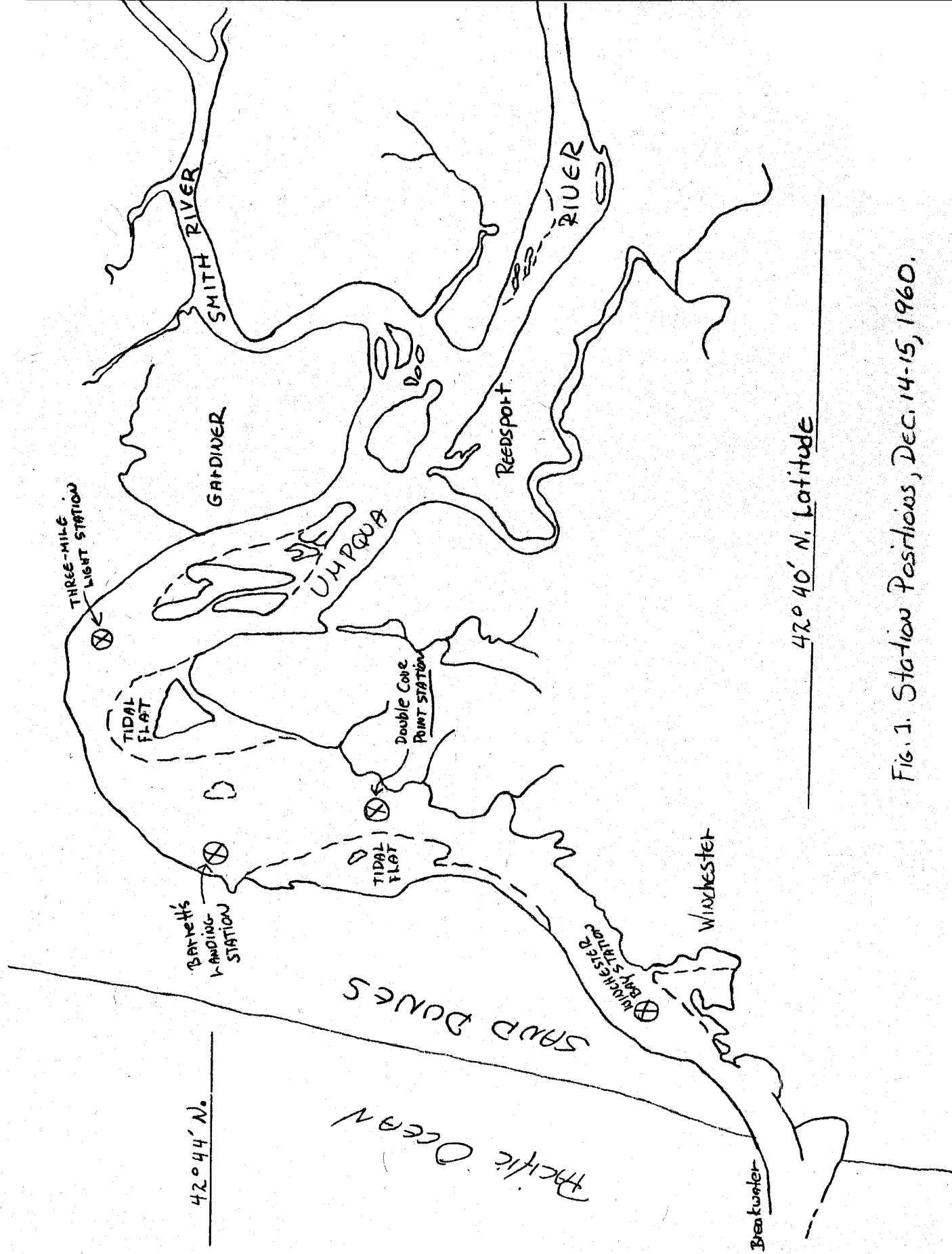


Fig. 1. Station Positions, Dec. 14-15, 1960.

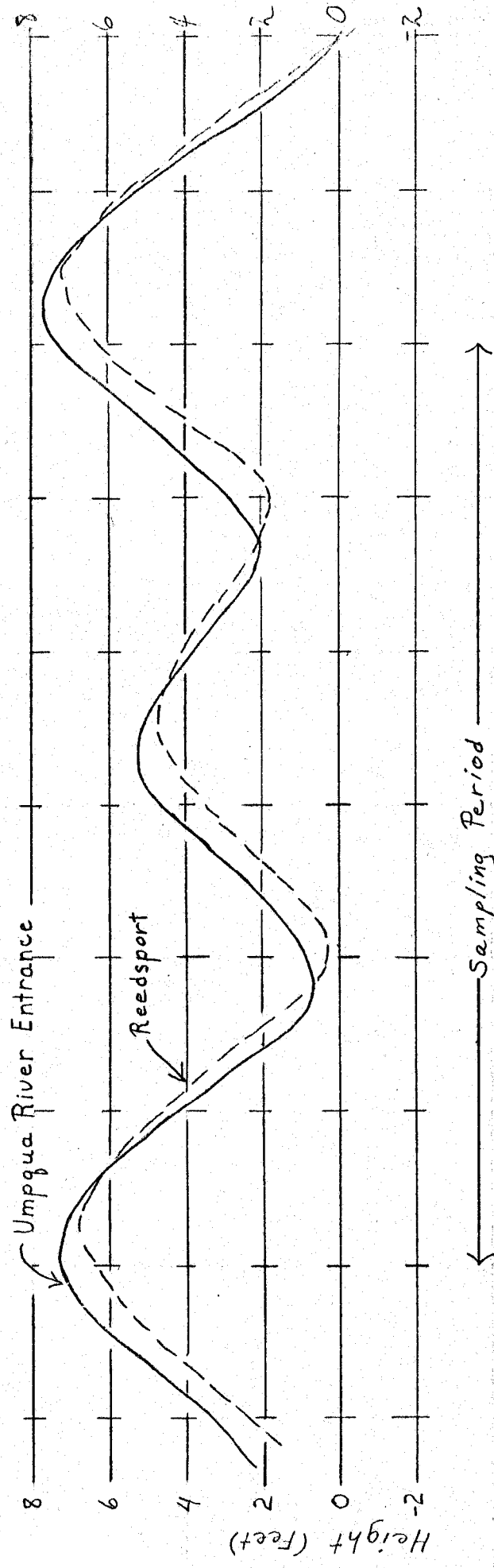
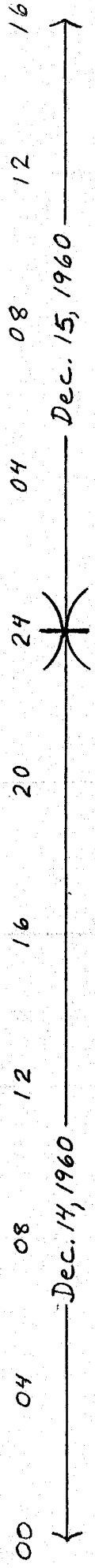


Fig. 2 Predicted Tides, Entrance and Reedsport



STATION: Winchester Bay

DATE: December 14, 1960

TIME: 0807

0842

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	10.5	27.6	0	0.6 F		
5	11.0	29.6	5	1.1		
10	11.0	29.8	9	1.2		
15	11.1	30.0	14	1.1		
20	11.0	30.0	19	1.1		
25	11.1	30.0	23	1.3		
30	11.1	30.0	26	1.4		
35	11.1	30.1	32	1.3		
38	11.1	30.1	36	1.1		

STATION: Winchester Bay

DATE: December 14, 1960

TIME: 0907

0912

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	10.7	29.2	0	0.0		
5	10.8	29.8	5	0.3 E		
10	11.0	30.2	10	0.4		
15	11.0	30.3	15	0.0		
20	11.0	30.3	20	0.8 F		
25	11.0	30.3	25	0.7		
30	11.0	30.3	29	1.0		
35B	11.0	30.3	34	0.9		

STATION: Double Cove Point

DATE: December 14, 1960

TIME: 0944

0932

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	9.4	22.3	0	0.0 S		
5	10.7	28.8	5	0.0		
10	10.8	29.4	10	0.0		
15	10.9	29.7	15	0.0		
20	10.9	29.7	20	0.0		
27B	10.9	29.8	25	0.0		
			28	0.0		

STATION: Winchester Bay

DATE: December 14, 1960

TIME: 1007

1021

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	10.5	28.5	0	1.7 E		
5	10.9	30.0	4	1.9		
10	10.9	30.3	7	1.8		
15	10.9	30.4	11	1.9		
20	10.9	30.4	18	1.3		
25	10.9	30.5	23	1.2		
30	11.0	30.5	26	0.9		
32B						

STATION: Double Cove Point

DATE: December 14, 1960

TIME: 1042

1036

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	9.4	21.1	0	1.9 E		
5	9.9	24.6	5	1.1		
10	10.6	28.6	10	1.0		
15	10.6	28.8	14	1.0		
20	10.7	29.3	19	1.0		
25	10.8	29.4	23	0.8		
26B						

STATION: Winchester Bay

DATE: December 14, 1960

TIME: 1007

1102

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	10.0	24.6	0	3.1 E		
4	10.3	27.0	3	2.8		
9	10.5	28.5	6	2.6		
13	10.8	29.3	11	2.1		
17	10.8	29.6	16	1.9		
22	10.9	29.8	21	1.9		
25	10.9	29.9	25	1.8		
			28	1.7		

STATION: Double Cove Point

DATE: December 14, 1960

TIME: 1158

1148

1129

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.6	16.8	0	1.1 E	3	10.2
5	8.7	17.1	4	1.1	8	10.3
10	8.7	17.2	8	1.1	13	9.4
15	9.4	21.9	12	1.2	18	9.3
20	10.2	26.6	18	0.9		
22B	10.5	----	21	0.7		

STATION: Winchester Bay

DATE: December 14, 1960

TIME: 1207

1232

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.7	23.1	0	> 4.0 E		
5	9.4	----	4	2.4		
9	10.0	26.6	8	2.6		
13	10.2	27.2	12	2.4		
18	10.2	27.2	18	2.4		
22	10.3	27.4	23	2.3		
26	10.3	27.5				
30	10.3	27.6				

STATION: Double Cove Point

DATE: December 14, 1960

TIME: 1332

1325

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.8	13.8	0	3.5 E		
5	8.3	15.5	5	2.7		
9	8.5	16.3	9	2.2		
14	8.5	17.0	14	2.0		
20	8.9	18.7	19	2.0		
24	9.2	21.0				

STATION: Double Cove Point

DATE: December 14, 1960

TIME: 1417

1412

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.5	10.4	0	2.5 E		
5	7.8	12.4	4	2.4		
10	8.0	13.4	9	2.2		
15	8.1	14.2	14	2.0		
20	8.3	15.2	20	1.9		

STATION: Barrett's Landing

DATE: December 14, 1960

TIME:

1437

1432

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.9	6.3	0	2.9 E		
5	7.0	7.5	4	2.7		
9	7.2	8.2	8	2.5		
14	7.2	8.6	12	2.6		
18	7.2	9.0	17	2.4		
23	7.3	9.1	21	2.4		
27	7.3	9.1	26	2.4		
32	7.2	9.1	32	2.3		

STATION: Double Cove Point

DATE: December 14, 1960

TIME:

1512

1507

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.2	8.8	0	2.5 E		
5	7.6	11.2	4	1.8		
10	7.7	11.8	9	1.6		
15	7.9	12.6	15	1.5		
20	7.9	12.9				

STATION: Barrett's Landing

DATE: December 14, 1960

TIME:

1532

1527

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.7	5.6	0	2.4 E		
5	6.8	6.2	4	2.0		
10	7.0	7.0	8	1.9		
15	7.0	7.0	13	1.9		
20	7.2	8.6	17	1.7		

STATION: Double Cove Point

DATE: December 14, 1960

TIME:

1555

1547

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.0	7.5	0	1.7 E		
5	7.1	7.5	4	1.8		
10	7.5	10.6	10	1.4		
15	7.7	11.5	15	1.2		
20B	7.8	12.3	18	0.0		

STATION: Barrett's Landing

DATE: December 14, 1960

TIME:

1702

1707

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.4	4.3	0	0.0 S		
5	6.4	4.5	5	0.0		
10	6.6	5.4	10	0.0		
15	6.8	6.2	15	0.0		
20	6.8	6.4	20	0.0		
25	6.9	6.9	25	0.0		
30	7.0	7.3	30	0.0		
35	7.1	7.6	35	0.0		
40	7.1	7.7	40	0.0		
45	7.1	7.8	46	0.0		
50	7.1	7.8				

STATION: Double Cove Point

DATE: December 14, 1960

TIME:

1747

1737

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.3	9.1	0	0.7 E		
5	7.5	10.4	5	0.3		
10	7.8	12.0	10	0.0		
15	8.0	13.2	15	0.0		
20	8.3	15.0	20	0.0		
21B	8.3	15.0	23	0.8 F		

STATION: Barrett's Landing

DATE: December 14, 1960

TIME:

1849

1842

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.9	6.8	0	1.8 F		
5	7.6	10.6	4	1.9		
10	7.6	10.8	8	1.9		
15	7.7	11.5	12	2.0		
20	7.8	11.8	16	1.9		
25	7.8	12.4	20	2.0		
29	7.8	12.4	26	1.8		

STATION: Double Cove Point

DATE: December 14, 1960

TIME: 1933

1927

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.3	15.8	0	3.4 F		
5	8.3	15.4	3	2.8		
10	8.4	16.2	5	2.8		
14	8.6	17.0	8	2.8		
20	8.7	17.2	12	2.5		
25	8.7	17.4	18	2.1		

STATION: Barrett's Landing

DATE: December 14, 1960

TIME: 2020

2014

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.6	11.0	0	0.0		
5	7.6	11.3	5	0.0		
10	8.1	13.5	10	1.0 F		
15	8.3	15.3	15	1.0		
20	8.4	15.4	20	1.5		
25	8.4	15.9	24	1.6		
30	8.4	16.1	28	1.7		
35	8.5	16.2	30	1.8		
40	8.5	16.2	36	1.8		
			40	1.6		

STATION: Double Cove Point

DATE: December 14, 1960

TIME: 2113

2111

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	9.6	23.5	0	0.0		
5	9.9	26.5	5	0.0		
10	10.2	26.3	9	1.8 F		
15	10.6	28.5	15	1.5		
20	10.7	29.3	19	1.7		
25	10.7	29.3	25	0.0		

STATION: Barrett's Landing

DATE: December 14, 1960

TIME: 2232			2227		2202	
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.5	16.8	0	0.0	0	10.5
5	8.6	18.3	5	0.0	5	10.1
10	9.4	22.6	10	0.0	10	9.9
15	10.1	26.6	15	0.0	15	9.9
20	10.4	27.7	20	1.2 F	20	9.4
25	10.4	27.8	25	1.3	25	9.4
30	10.4	28.0	30	0.0		
35	10.4	28.0				
40	10.5	28.1				

STATION: Double Cove Point

DATE: December 14, 1960

TIME: 2325			2320			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.7	18.8	0	1.6 E		
5	8.9	19.9	5	1.5		
10	9.9	26.4	10	1.3		
15	10.7	29.3	15	1.1		
20	10.8	30.1	18	1.1		

STATION: Barrett's Landing

DATE: December 15, 1960

TIME: 0122			0102			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.1	8.1	0	3.5 E		
5	7.4	9.3	4	3.1		
9	7.7	11.0	8	3.0		
14	7.8	11.6	13	2.9		
19	8.5	16.0	19	2.5		
24	10.0	27.0	25	2.4		
26	10.5	28.4				

STATION: Barrett's Landing

DATE: December 15, 1960

TIME: 0207			0212			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	6.9	6.8	0	3.3 E		
5	7.2	8.0	4	2.8		
9	7.3	9.0	9	2.7		
14	7.4	9.9	15	2.4		
19	8.4	15.7	20	2.3		
24	9.5	23.2	23	2.2		

STATION: Barrett's Landing

DATE: December 15, 1960

TIME: 0312

0305

Depth (feet)	Temp. (° C)	Sal. (°/oo)
0	6.7	5.6
5	6.9	6.6
10	7.0	6.8
15	7.8	12.7
20	8.0	13.5
25	9.0	19.9

Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	2.5 E		
4	2.0		
9	1.8		
15	1.5		
20	1.4		

STATION: Barrett's Landing

DATE: December 15, 1960

TIME: 0412

0405

Depth (feet)	Temp. (° C)	Sal. (°/oo)
0	6.6	4.7
5	6.7	5.5
10	6.8	6.4
15	7.8	11.8
20	8.0	13.3
25	10.3	26.7

Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	1.4 E		
5	0.5		
10	0.2 F		
15	0.3		
19	0.7		
23	0.5		

STATION: Barrett's Landing

DATE: December 15, 1960

TIME: 0512

0507

Depth (feet)	Temp. (° C)	Sal. (°/oo)
0	6.7	5.5
5	7.1	8.0
10	7.5	10.8
15	8.8	14.8
20	9.6	22.9
24	10.1	26.7
29	10.2	27.2

Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	0.0		
5	0.5 F		
8	1.0		
11	1.3		
12	1.5		
19	1.7		
21	1.9		
24	1.9		

STATION: Barrett's Landing

DATE: December 15, 1960

TIME: 0612

0607

Depth (feet)	Temp. (° C)	Sal. (°/oo)
0	7.0	7.5
5	7.3	9.4
10	8.2	15.0
15	8.5	16.9
19	9.4	22.4
21	9.8	25.0

Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	1.7 F		
4	1.8		
9	1.8		
12	2.0		
15	2.1		
17	2.1		
27	1.8		

STATION: Barrett's Landing

DATE: December 15, 1960

TIME: 0705			0702			
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	7.6	11.7	0	1.6 F		
5	8.5	17.0	5	1.6		
10	9.0	20.2	9	1.6		
15	9.4	22.2	13	1.8		
20	9.5	23.0	17	1.8		
24	9.8	24.9	20	2.0		
29	9.9	25.8	26	1.9		
32	9.9	25.8	29	1.9		

STATION: Winchester Bay

DATE: December 15, 1960

TIME: 0807			0738		0750	
Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	11.0	31.3	0	3.1 F	0	8.9
5	11.0	31.4	4	3.2	4	9.0
10	11.0	31.4	7	3.3	8	8.7
14	11.0	31.5	12	3.1	12	8.9
19	11.0	31.5	15	3.2	16	8.8
23	11.0	31.5	19	3.2		
27	11.0	31.5	24	3.1		
32	11.0	31.5	30	2.9		
37	11.0	31.5	32	3.0		

STATION: Double Cove Point

DATE: December 15, 1960

TIME: 0830			0827			
Depth (feet)	Temp. (° C)	Sal. (‰)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	10.7	30.2	0	2.8 F		
5	10.7	30.3	5	2.8		
10	10.8	30.3	10	2.6		
15	10.8	30.4	14	2.6		
20	10.8	30.4	20	2.4		
24	10.8	30.5	24	2.4		
29	10.8	30.5	30	2.2		
32	10.8	30.5				

STATION: Barrett's Landing

DATE: December 15, 1960

TIME:

0912

0850

0857

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	----	----	0	1.5 F	20	9.1
5	10.3	27.8	5	1.6	25	9.2
10	10.4	27.9	10	1.6	30	9.0
15	10.4	28.4	15	1.6	35	9.1
20	10.4	28.6	19	1.6	40	9.1
25	10.5	28.8	21	1.9		
30	10.5	28.9	24	1.9		
35	10.6	29.3	29	1.9		
40	10.6	29.3	34	1.9		
			38	1.9		

STATION: Three-Mile Light

DATE: December 15, 1960

TIME:

0937

0932

Depth (feet)	Temp. (° C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Oxy. (PPM)
0	8.1	15.7	0	0.0 S		
5	8.4	17.1	5	0.0		
10	9.4	22.6	10	0.0		
15	9.5	23.4	15	0.0		
20	9.5	23.4	20	0.0		
25	9.6	23.8	25	0.0		
30	9.6	23.9	30	0.0		
			32	0.0		