ULLO STUDY
of Oceanography
tate University

UMPQUA

Department of Oceanography
Oregon State University
Corvallis, Oregon

DEC 1976
PATTULLO STUDY
OCEANOGRAPHY
OSU

PHYSICAL AND CHEMICAL OCEANOGRAPHIC DATA

UMPQUA RIVER ESTUARY

OREGON

Part IV: April 26-27, 1961

by
Richard J. Callaway
Oceanographer

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

MARILYN POTTS GUIN LIBRARY
HATFIELD MARINE SCIENCE CENTER
OREGON STATE UNIVERSITY
NEWPORT, OREGON 97365

ABSTRACT

Oceanographic data collected in the Umpqua River Estuary, Oregon, during the period April 26-27, 1961, are tabulated. Temperature, salinity, velocity, and dissolved oxygen were observed at various depths over one tidal cycle at a mid-channel anchor station located near the mouth of the river.

TABLE OF CONTENTS

Introduction	1
Station location	1
Data collected	1
Acknowledgments	3
Literature cited	4

Illustrations

Fig. 1 Station and cross-section location
Fig. 2 Cross-section profile of river bottom
Fig. 3 Predicted tide curve, Umpqua River Entrance
Fig. 4 Predicted and observed surface velocity
Fig. 5 Net, ebb, and flood velocity-depth curves
Figs. 6-9 Velocity time-series, 0 to 35 feet
Fig. 10 Dissolved oxygen time-series
Fig. 11 Velocity and salinity time-series

Tables

Table 1 Computed velocities
Table 2 Dissolved oxygen observations
Table 3 Observed data

INTRODUCTION

This report is the fourth in a series listing data collected in the Umpqua River Estuary, Oregon, (Callaway, 1961, a, b, c).

Data collected during April 26-27, 1961, are presented.

STATION LOCATION

An anchor station was occupied for approximately 25 hours at the position shown in Fig. 1. Fig. 2 shows the cross-section profile of the river bottom at the anchor station.

DATA COLLECTED

Temperature and salinity data were obtained hourly from the surface to the bottom at five-foot intervals.

Velocity was measured every half-hour at five-foot intervals of depth.

Dissolved oxygen samples were collected every hour. Sampling depth was at five feet from the surface and about three feet from the bottom. A few surface samples were taken.

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

Salinity: Salinity data were obtained using the CBI conductivity-temperature indicator. The accuracy of these data should be about ± 0.1 °/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. Analyses were performed by Mr. Glen Carter, Oregon State Sanitary Authority, Portland, Oregon, one to two days after collection of samples.

Velocity: The Price current meter (U. S. Department of Commerce, 1950) was used to determine velocity.

Fig. 3 shows the predicted tidal height curve, Umpqua River Entrance.

Fig. 4 shows the predicted tidal current curve, river entrance, and a plot of observed surface current velocities.

Average velocity versus depth curves and the net velocity-depth curve are shown in Fig. 5. The points on these curves were determined by planimetering as explained in previous reports.

Figures 6-9 are plots of observed half-hourly velocity measurements from the surface to thirty-five feet. As shown in these figures and Table 1, the duration time of the ebb cycles decreases with depth while that of the flood cycles increases with depth.

Hourly dissolved oxygen measurements are shown in Fig. 10.

Fig. 11 is a time-series of velocity and salinity. To allow for the changing depth due to the tide, values were taken at 0.25, 0.5, 0.75, and 1.0 of the total depth from individual velocity and salinity curves.

ACKNOWLEDGMENTS

Thanks are due to Chief Boatswains Mate Stevens of the Umpqua River Lifeboat Station for providing vessel and crew time for this survey.

Mr. Glen Carter of the Oregon State Sanitary Authority made the oxygen determinations and Mr. Earl N. Kari (USPHS) assisted in the field.

LITERATURE CITED

Callaway, Richard J.

1961a. Physical and chemical oceanographic data, Umpqua River Estuary, Oregon. Part I: December 14-15, 1960. Mimeographed report, U. S. Public Health Service, Portland, Oregon. January 1961.

---- 1961b. Physical and chemical oceanographic data, Umpqua River Estuary, Oregon. Part II: January 25-26, 1961. Mimeographed report, U. S. Public Health Service, Portland, Oregon. February 1961.

---- 1961c. Physical and chemical oceanographic data, Umpqua River Estuary, Oregon. Part III: March 21-22, 1961. Mimeographed report, U. S. Public Health Service, Portland, Oregon. April 1961.

U. S. Department of Commerce.

1950 Manual of current observations. Coast and Geodetic Survey Special Publication No. 215, Revised (1950) edition.

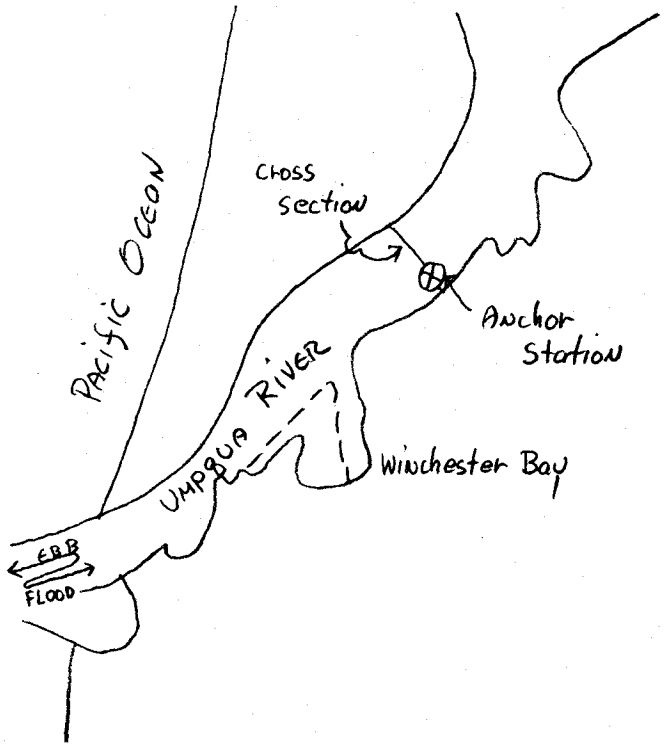

Fig. 1. Anchor station and cross-section location. Umpqua River, Buoy 7. April 26-27, 1961

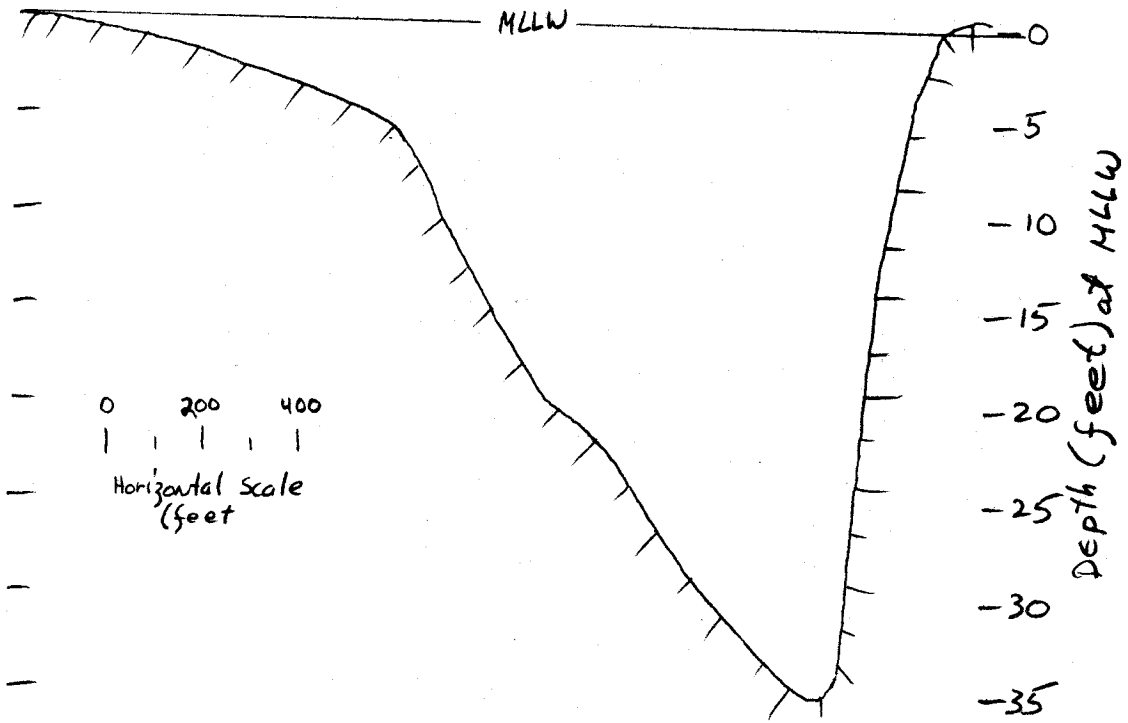

Fig. 2. Cross-section, looking upstream, at station shown in fig. 1.

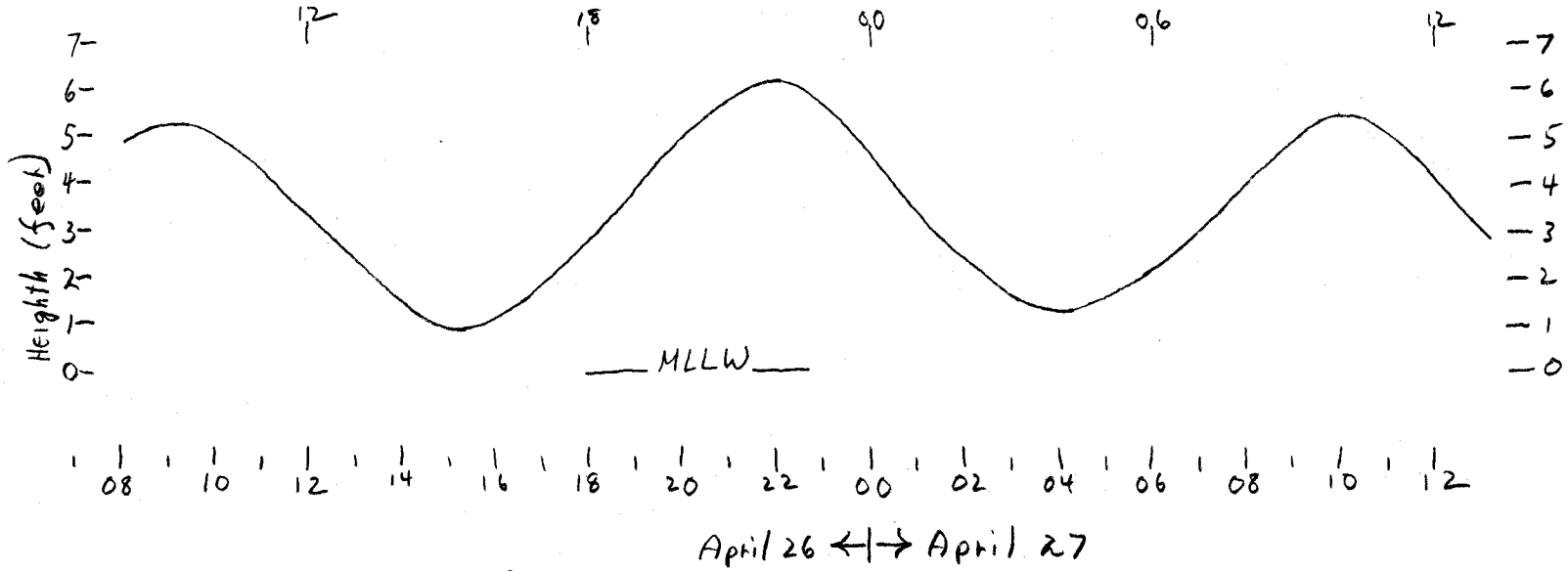

Fig. 3 Predicted tide curve, Umpqua River Entrance.

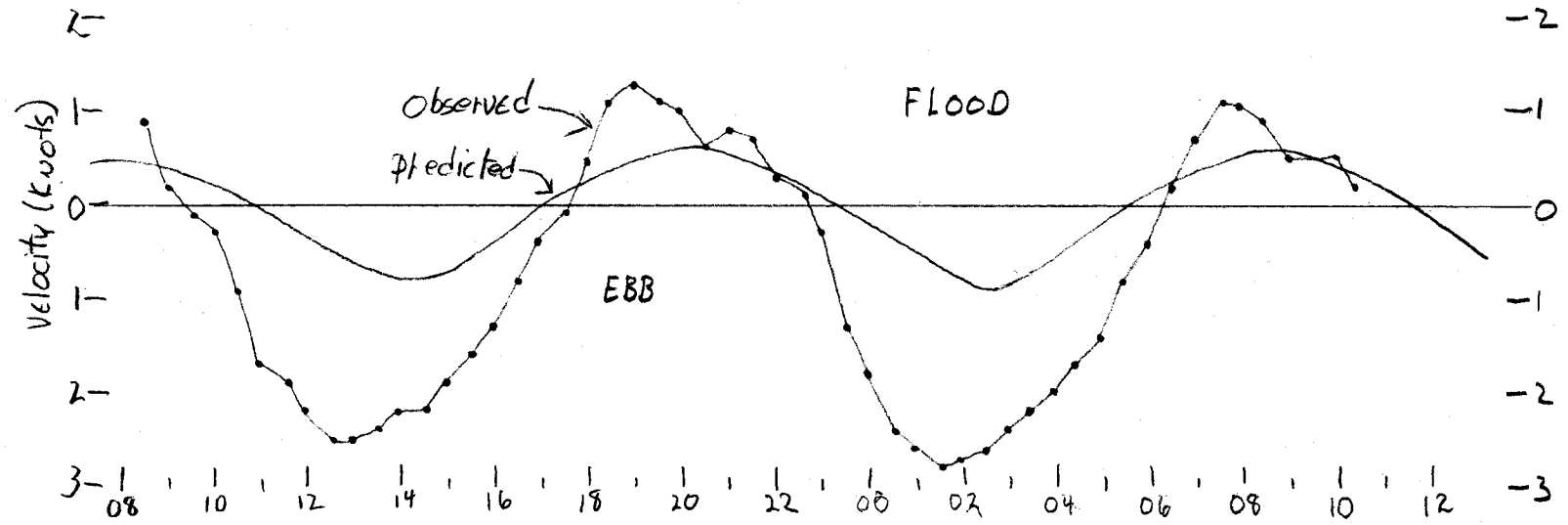

Fig. 4 Observed surface velocity, Buoy 7, Umpqua River, April 26-27, 1961
Predicted velocity is for river entrance.

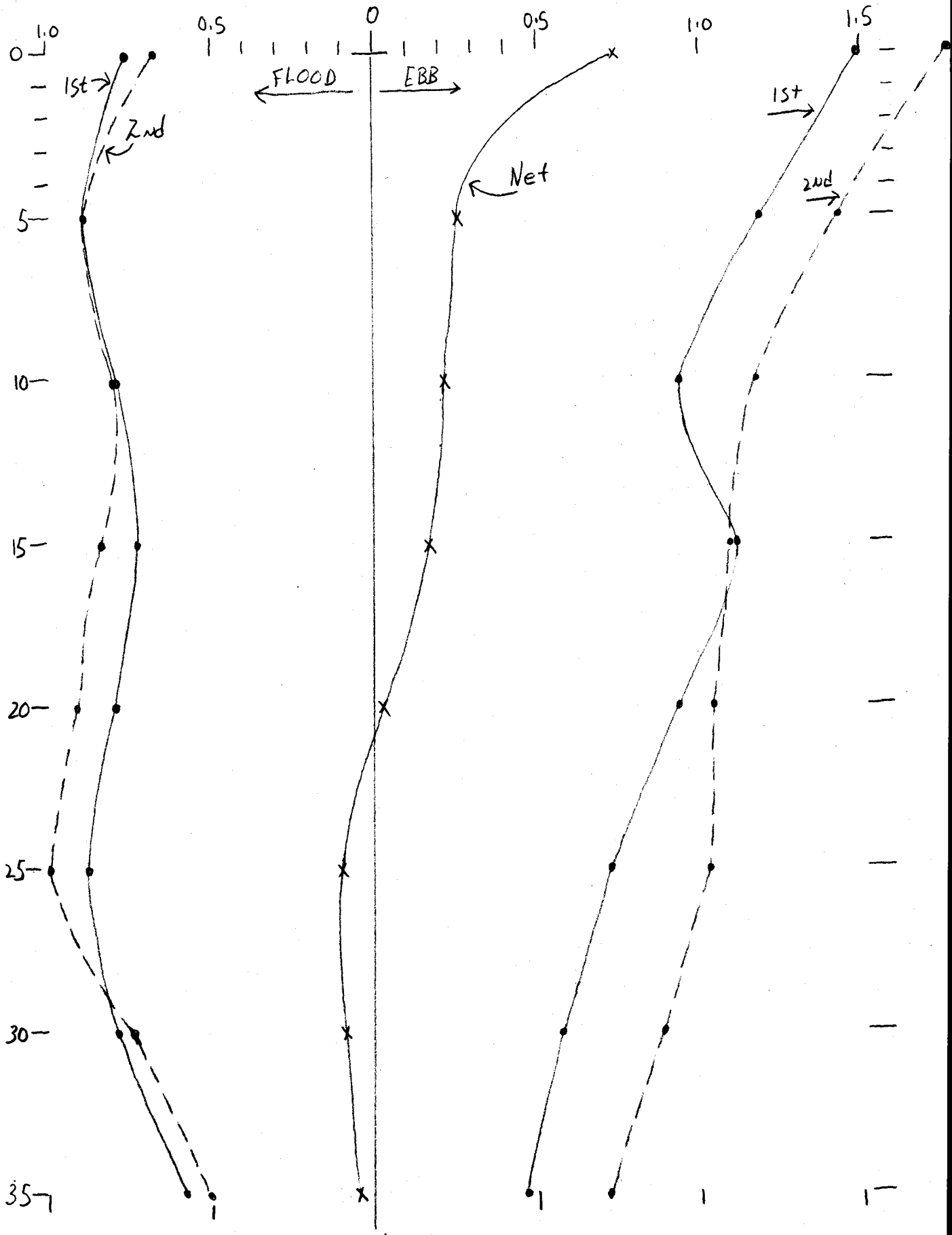

Fig. 5 Net velocity-depth and velocity-depth curves for ebb and flood cycles. Buoy 7, Umpqua River. April 26-27, 1961.

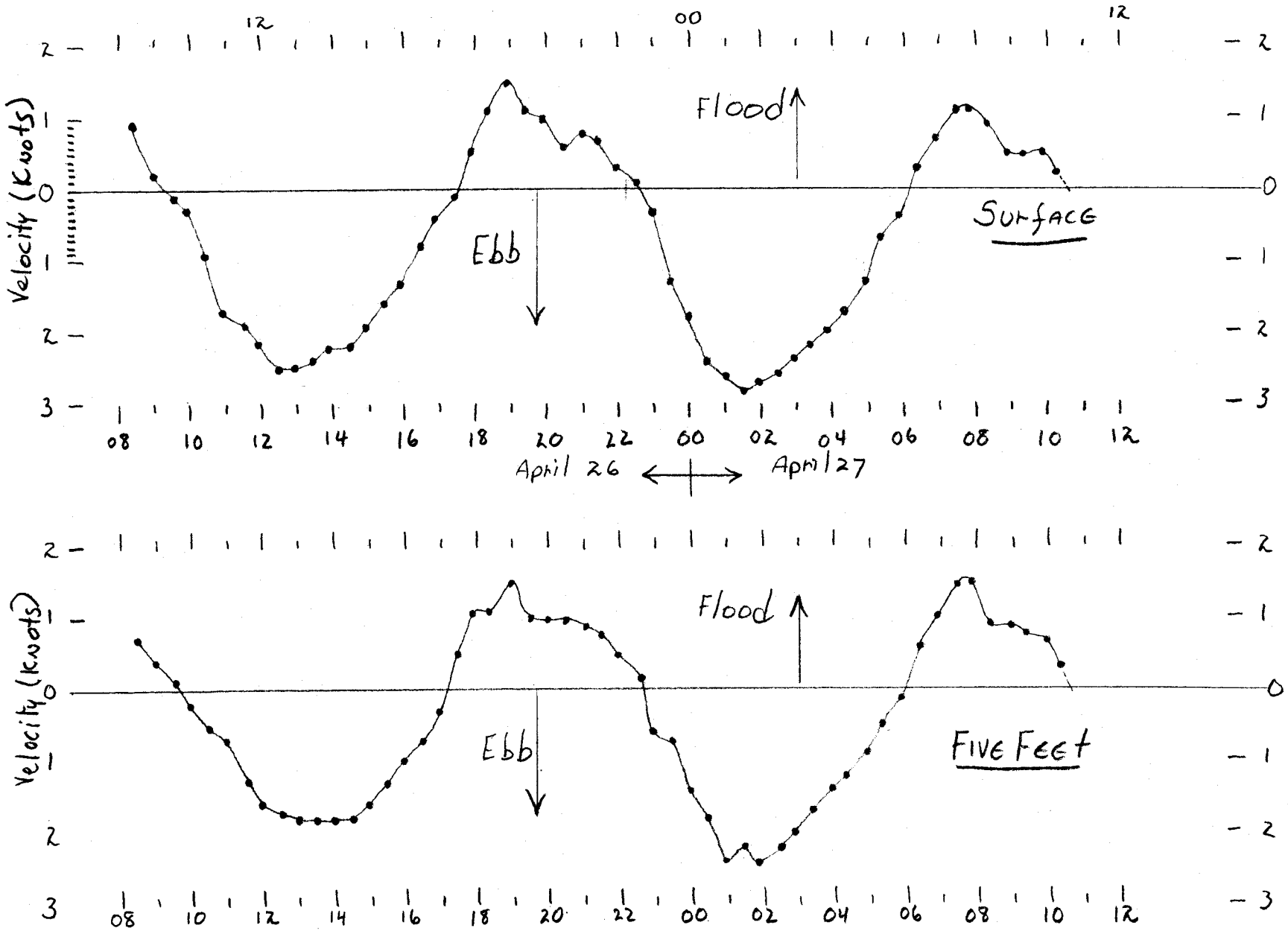

Fig. 6 Velocity time-series, Buoy 7, Umpqua River. April 26-27, 1961
Surface (upper) and Five feet (lower)

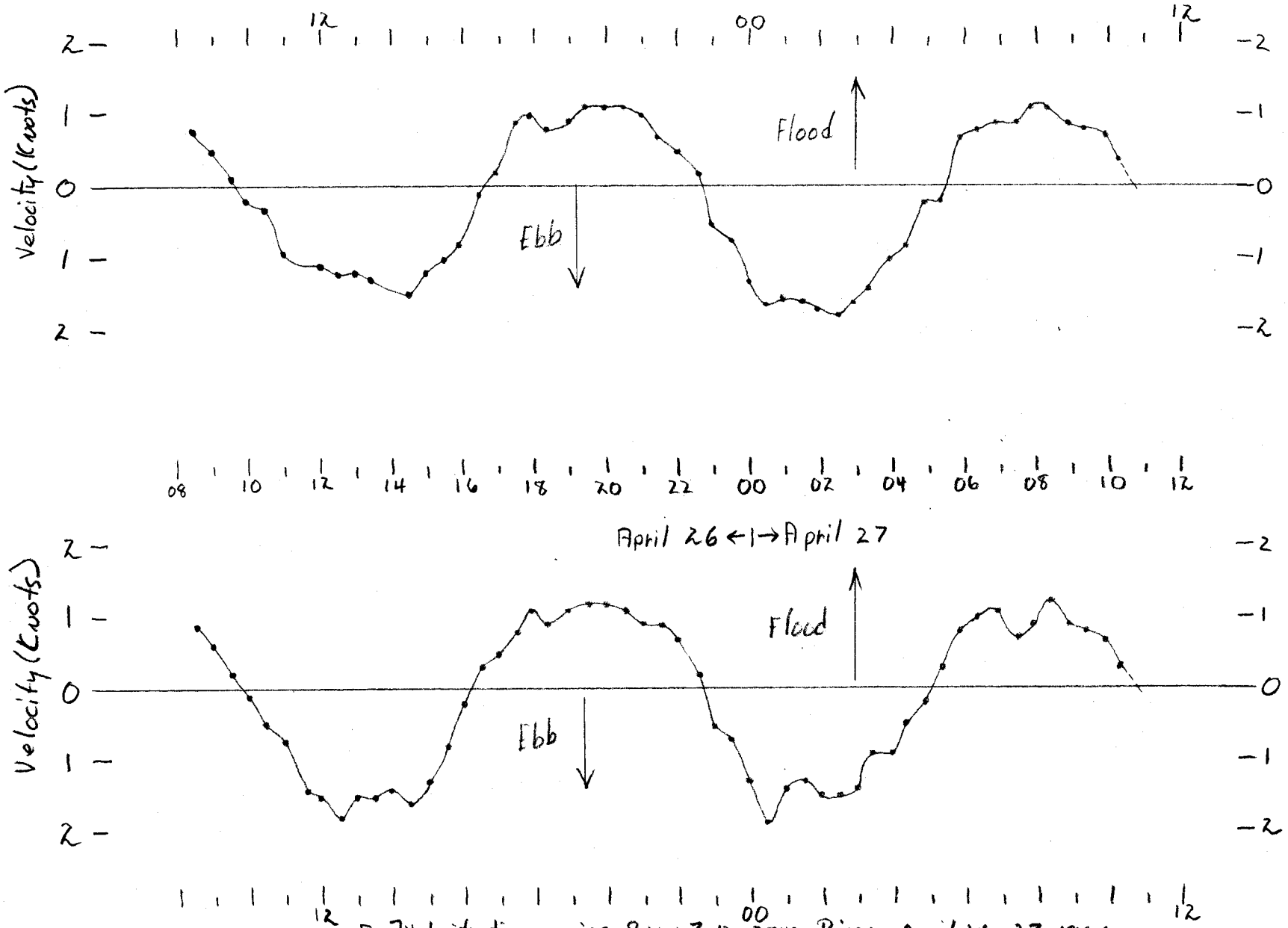

Fig. 7 Velocity time-series, Buoy 7, Umpqua River. April 26-27, 1961. Ten feet (upper); Fifteen feet (lower).

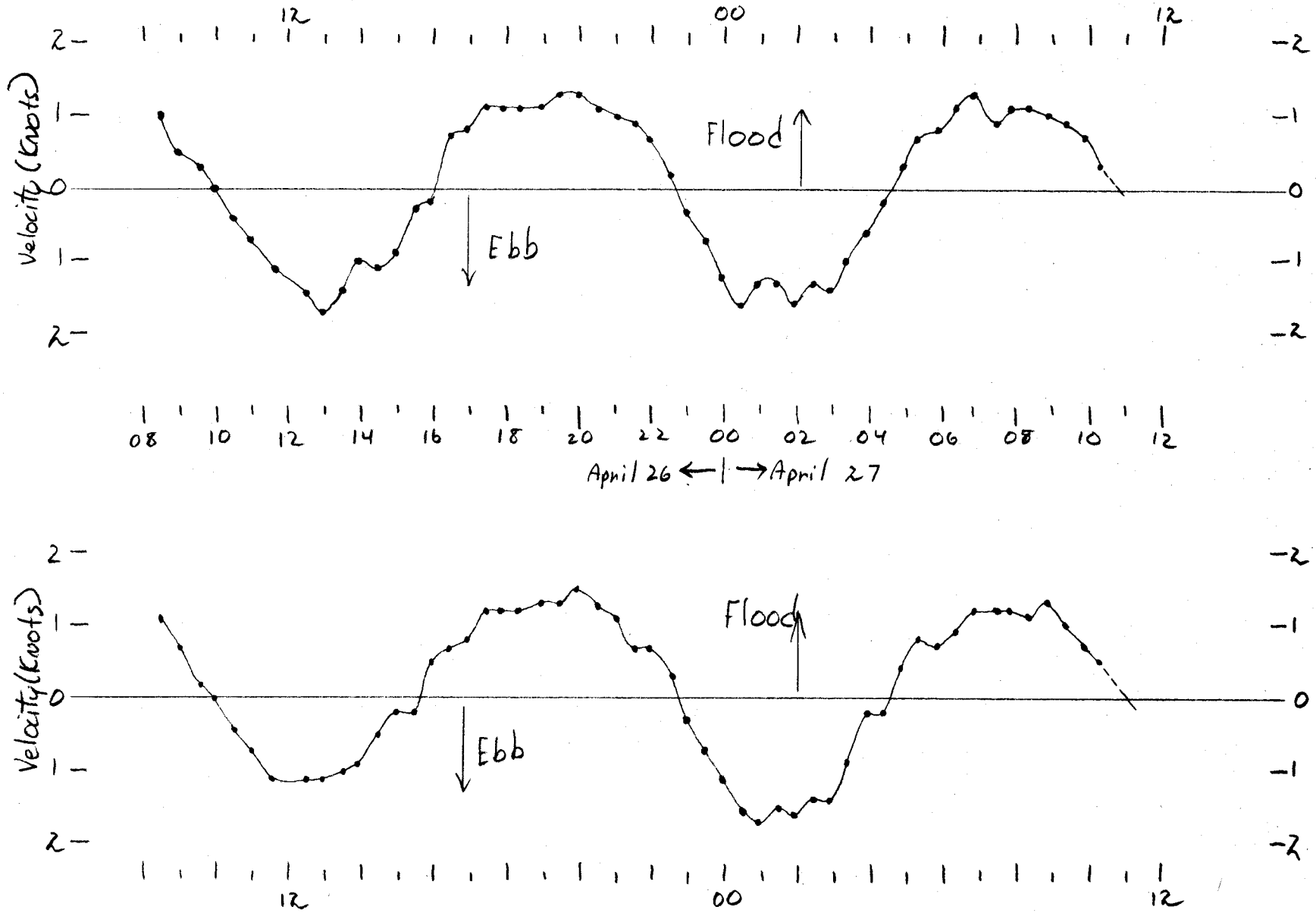

Fig. 8 Velocity time-series, Buoy 7, Umpqua River. April 26-27, 1961
Twenty-feet (upper) and Twenty-five feet (lower)

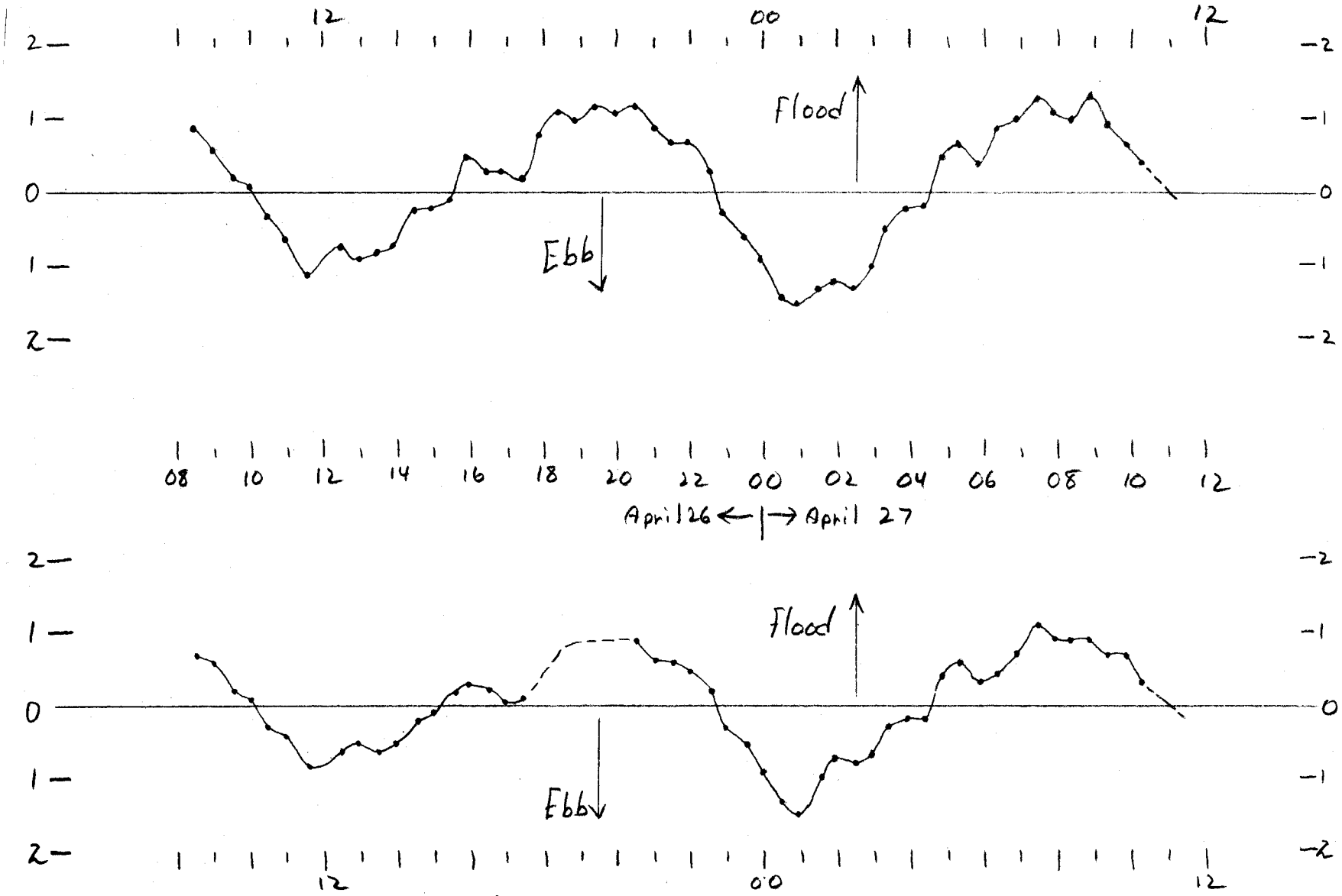

Fig. 9 Velocity time-series, Buoy 7, Umpqua River, April 26-27, 1961
thirty feet (upper) and thirty-five feet (lower)

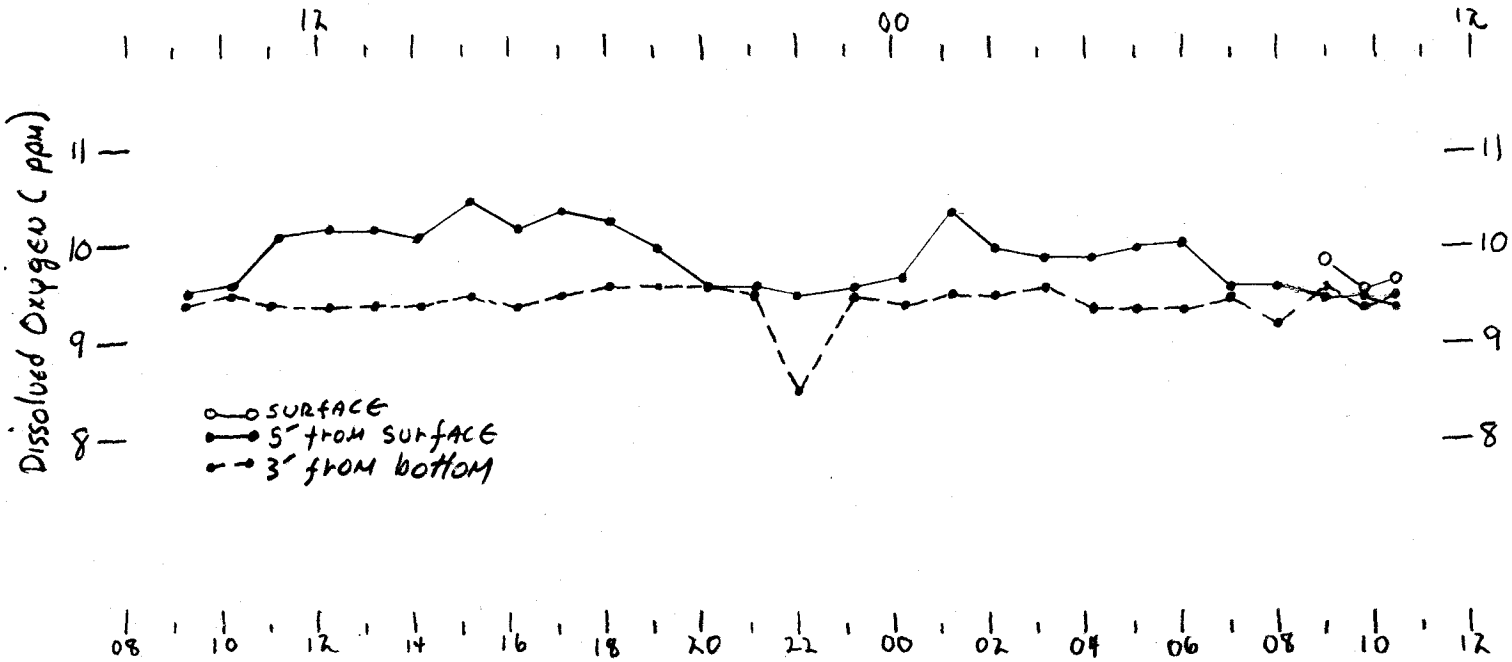

FIG. 10 Oxygen time-series, Buoy 7, Umpqua River
April 26-27, 1961

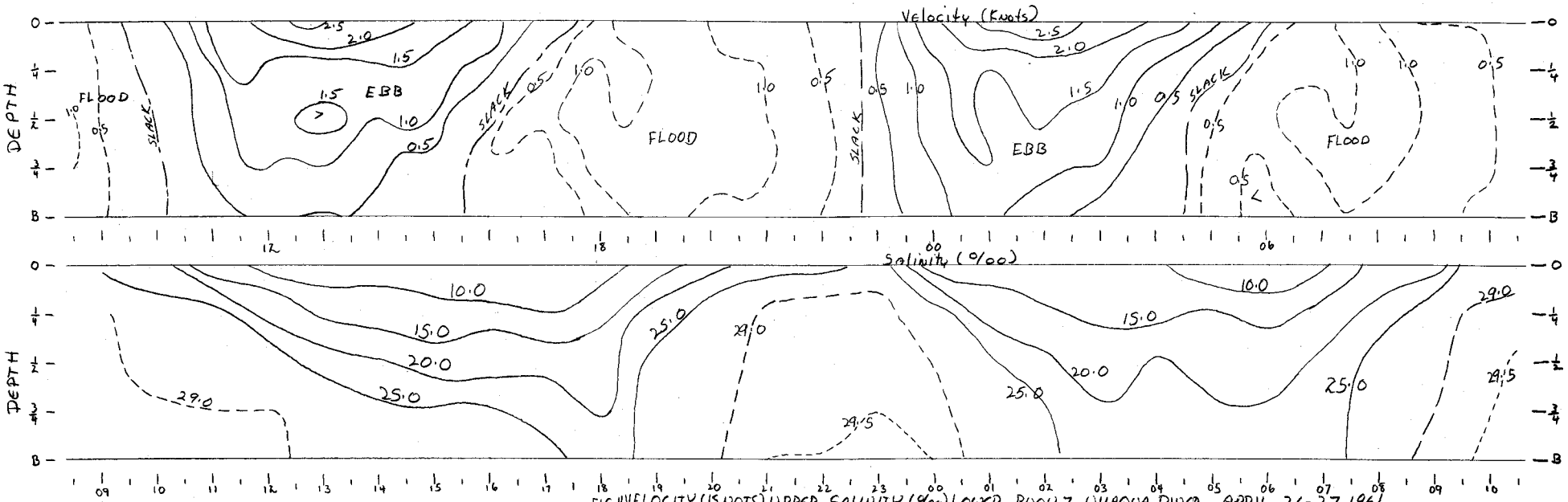

FIG. 11 VELOCITY (IN KNOTS) UPPER. SALINITY (0/00) LOWER. BUOY 7, UMPQUA RIVER. APRIL 26-27, 1961.

Table 1

Computed velocities, Buoy 7, Umpqua River, April 26-27, 1961

Depth (feet)	Mean Vel. (knots) / Duration (hours)	1st Ebb	1st Flood	2nd Ebb	2nd Flood
0	Mean Vel.	1.49	0.76	1.77	0.67
	Duration	8.3	5.3	7.5	4.3
5	Mean Vel.	1.20	0.89	1.43	0.89
	Duration	7.4	5.5	7.3	4.7
10	Mean Vel.	0.94	0.80	1.18	0.79
	Duration	7.0	6.1	6.6	5.2
15	Mean Vel.	1.12	0.84	1.10	0.73
	Duration	6.3	6.5	6.3	5.7
20	Mean Vel.	0.94	0.91	1.04	0.79
	Duration	6.1	6.7	5.9	6.2
25	Mean Vel.	0.72	1.00	1.03	0.88
	Duration	5.7	7.0	5.8	6.4
30	Mean Vel.	0.57	0.74	0.89	0.79
	Duration	5.5	7.2	5.8	6.5
35	Mean Vel.	0.46	0.51	0.72	0.59
	Duration	5.1	7.5	5.8	6.5

TIME / DEPTH	0915	1012	1109	1215	1310	1405	1510	1610	1705	1802	1905	2008
5'	9.5	9.6	10.1	10.2	10.2	10.1	10.5	10.2	10.4	10.3	10.0	9.6
3' from bottom	9.4	9.5	9.4	9.4	9.4	9.4	9.5	9.5	9.4	9.6	9.6	9.6

TIME / DEPTH	2110	2200	2312	0012	0112	0205	0310	0405	0502	0600
5'	9.6	9.5	9.6	9.7	10.4	10.0	9.9	9.9	10.0	10.1
3' from bottom	9.5	8.5	9.5	9.4	9.5	9.5	9.6	9.4	9.4	9.4

TIME / DEPTH	0700	0759	0855	0947	1027
0'			9.8	9.5	9.7
5'	9.6	9.6	9.5	9.4	9.5
3' from bottom	9.5	9.2	9.6	9.5	9.4

Table 2. TIME SERIES OF DISSOLVED OXYGEN, PPM.
BUOY 7, UMPQUA RIVER, APRIL 26-27, 1961

TABLE 3

OBSERVED TEMPERATURE, SALINITY AND VELOCITY DATA. BUOY 7, UMPQUA RIVER.

April 26-27, 1961

STATION: Buoy 7 DATE: April 26, 1961

TIME:	0910		0825		0858	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	10.8	24.1	0	0.9 F	0	0.2 F
5	10.6	28.5	5	0.7	5	0.4
10	10.6	28.6	10	0.8	10	0.5
15	10.6	28.7	15	0.9	15	0.6
20	10.6	28.8	20	1.0	20	0.5
25	10.6	28.9	25	1.1	25	0.7
30	10.6	29.1	30	0.9	30	0.6
35	10.6	29.1	35	0.7	35	0.6
38	10.6	29.1	38	0.8		

STATION: Buoy 7 DATE: April 26, 1961

TIME:	1007		0933		0958	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.1	20.5	0	0.1 E	0	0.3 E
5	10.7	28.6	5	0.1 F	5	0.2
10	10.6	29.1	10	0.1	10	0.2
15	10.6	29.1	15	0.2	15	0.1
20	10.6	29.2	20	0.3	20	0.0
25	10.6	29.3	25	0.2	25	0.0
30	10.6	29.3	30	0.3	30	0.1 F
35	10.6	29.3	35	0.2	35	0.1
40	10.6	29.3	40	0.2	40	0.2
44	10.6	29.4			44	0.1

STATION: Buoy 7 DATE: April 26, 1961

TIME:	1103		1025		1056	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.6	10.6	0	0.9 E	0	1.7 E
5	11.4	14.7	5	0.5	5	0.7
10	10.7	27.6	10	0.3	10	0.9
15	10.7	28.4	15	0.5	15	0.7
20	10.7	28.6	20	0.4	20	0.7
25	10.6	29.1	25	0.4	25	0.7
30	10.6	29.2	30	0.3	30	0.6
35	10.6	29.3	35	0.3	35	0.4
40	10.6	29.3	40	0.3	40	-
44	10.6	29.3	42	0.2		

STATION: Buoy 7 DATE: April 26, 1961

TIME:	1210		1135		1155	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	12.3	9.7	0	1.9 E	0	2.2 E
5	11.9	12.3	5	1.3	5	1.6
10	11.4	18.6	10	1.8	10	1.1
14	11.1	21.1	15	1.4	15	1.5
19	10.7	26.7	20	1.1	20	-
24	10.7	28.5	24	1.0	--	-
29	10.6	28.8	29	1.2		
34	10.6	29.1	34	0.9		
39	10.6	29.1	39	0.7		
42	10.6	29.1	42	0.5		

STATION: Buoy 7 DATE: April 26, 1961

TIME:	1300		1230		1255	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	12.1	8.7	0	2.5 E	0	2.5 E
5	11.9	11.4	5	1.7	5	1.8
10	11.7	14.1	10	1.2	10	1.2
14	11.3	18.5	15	1.8	14	1.5
19	10.9	24.1	19	1.5	19	1.8
24	10.9	25.4	24	1.2	23	1.2
28	10.8	26.5	28	0.8	28	1.0
34	10.7	27.6	33	0.6	34	0.6
39	10.7	27.6	38	0.5	38	0.4

STATION: Buoy 7 DATE: April 26, 1961

TIME:	1400		1326		1354	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	12.1	9.5	0	2.4 E	0	2.2 E
5	12.1	11.2	5	1.8	5	1.8
10	12.0	12.0	10	1.3	10	1.4
14	11.3	18.2	14	1.6	14	1.6
19	11.1	22.7	19	1.5	19	1.1
24	10.9	24.8	24	1.1	24	0.9
29	10.8	26.1	28	0.8	29	0.7
34	10.8	26.3	33	0.7	34	0.6
39	10.8	26.5	38	0.5	39	0.3

STATION: Buoy 7 DATE: April 26, 1961

TIME:	1505		1430		1455	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	12.3	8.6	0	2.2 E	0	1.9 E
5	12.1	10.2	5	1.8	5	1.6
10	12.1	11.0	10	1.5	10	1.2
15	11.8	13.8	14	1.6	15	1.3
20	11.3	18.5	20	1.1	20	0.9
25	11.0	23.4	24	0.6	25	0.2
30	10.9	25.5	29	0.2	30	0.2
35	10.9	25.9	34	0.2	35	0.1
41	10.8	26.4	38	0.2	38	0.2

STATION: Buoy 7 DATE: April 26, 1961

TIME:	1604		1525		1554	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	12.3	7.7	0	1.6 E	0	1.3 E
5	12.3	8.8	5	1.3	5	1.0
10	11.7	12.4	10	1.0	10	0.8
15	11.4	17.6	15	0.8	15	0.2
20	11.3	18.2	20	0.3	20	0.2
25	11.0	24.0	25	0.2	25	0.5 F
30	10.9	25.2	30	0.1	30	0.5
35	10.9	25.9	35	0.2	35	0.3
40	10.8	26.2	40	0.1	37	0.2
41	10.8	26.3				

STATION: Buoy 7 DATE: April 26, 1961

TIME:	1700		1625		1653	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	12.3	7.3	0	0.8 E	0	0.4 E
5	12.3	7.5	5	0.7	5	0.3
10	12.1	10.0	10	0.1	10	0.2 F
15	11.5	14.8	15	0.3 F	15	0.5
20	11.3	18.3	20	0.7	20	0.8
25	11.2	20.2	25	0.7	25	0.8
30	11.0	23.9	30	0.3	30	0.3
35	10.9	25.4	35	0.2	35	0.0
40	10.9	25.7	40	0.1	40	0.3
					43	0.2

STATION: Buoy 7 DATE: April 26, 1961

TIME:	1758		1725		1752	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	12.4	8.0	0	0.1 E	0	0.5 F
5	12.3	10.2	5	0.5 F	5	1.1
10	12.0	14.0	10	0.9	10	1.0
15	11.5	17.2	15	0.8	15	1.1
20	11.3	19.0	20	1.1	20	1.1
25	11.3	19.9	25	1.2	25	1.2
29	11.2	21.0	30	0.2	30	0.8
33	11.1	22.4	35	0.1	31	0.7
			39	0.2		

STATION: Buoy 7 DATE: April 26, 1961

TIME:	1900		1823		1855	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	12.2	12.0	0	1.1 F	0	1.3 F
5	11.9	16.0	5	1.1	5	1.5
10	11.3	21.8	10	0.8	10	0.9
15	11.1	25.7	15	0.9	15	1.1
20	10.9	26.9	20	1.1	20	1.1
25	11.0	27.0	25	1.2	25	1.3
29	11.0	27.3	30	1.1	29	1.0
35	11.0	27.4	33	1.0	34	1.0

STATION: Buoy 7 DATE: April 26, 1961

TIME:	2003		1925		1958	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.8	17.2	0	1.1 F	0	1.0 F
5	11.1	26.9	5	1.0	5	1.0
10	10.9	28.3	10	1.1	10	1.1
15	10.9	28.4	15	1.2	15	1.2
20	10.9	28.5	20	1.3	20	1.3
24	10.9	28.6	24	1.3	25	1.5
29	10.8	28.7	29	1.3	29	1.2
34	10.8	28.9	34	1.1	34	0.8
36	10.8	28.9				

STATION: Buoy 7 DATE: April 26, 1961

TIME:	2105		2030		2100	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.4	22.6	0	0.6 F	0	0.8 F
5	10.8	29.2	5	1.0	5	0.9
10	10.8	29.3	10	1.1	10	1.0
15	10.8	29.3	15	1.1	15	0.9
20	10.8	29.3	20	1.1	20	1.0
25	10.7	29.4	25	1.3	25	1.1
30	10.7	29.4	30	1.2	30	0.9
35	10.7	29.5	34	0.9	35	0.6

STATION: Buoy 7 DATE: April 26, 1961

TIME:	2200		2130		2155	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.1	22.4	0	0.7 F	0	0.3 F
5	10.9	29.2	5	0.8	5	0.5
10	10.7	29.4	10	0.7	10	0.5
15	10.7	29.5	15	0.9	15	0.7
20	10.7	29.5	20	0.9	20	0.7
25	10.7	29.5	25	0.7	25	0.7
30	10.7	29.5	30	0.7	30	0.7
35	10.7	29.5	35	0.6	35	0.5

STATION: Buoy 7 DATE: April 26, 1961

TIME:	2305		2235		2257	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.0	28.5	0	0.1 F	0	0.3 E
5	10.8	29.3	5	0.2	5	0.6
10	10.7	29.4	10	0.2	10	0.5
15	10.7	29.6	15	0.2	15	0.5
20	10.7	29.6	20	0.2	20	0.3
25	10.7	29.7	25	0.3	25	0.3
30	10.7	29.7	30	0.3	30	0.3
35	10.7	29.7	35	0.2	35	0.3
41	10.7	29.7			39	0.2

STATION: Buoy 7 DATE: April 26, 1961

TIME:	2359		2328		2355	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	10.8	14.1	0	1.3 E	0	1.8 E
5	10.9	26.6	5	0.7	5	1.4
10	10.8	28.3	10	0.7	10	1.3
15	10.8	28.7	15	0.7	15	1.3
20	10.8	29.0	20	0.7	20	1.2
24	10.7	29.2	25	0.7	25	1.1
29	10.7	29.4	30	0.6	30	0.9
34	10.7	29.4	35	0.5	34	0.9
39	10.7	29.5	40	0.3	39	0.9
43	10.7	29.5	44	0.5	43	0.8

STATION: Buoy 7 DATE: April 27, 1961

TIME:	0103		0025		0055	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.6	12.0	0	2.4 E	0	2.6 E
5	11.5	16.7	5	1.8	5	2.4
10	11.4	18.4	10	1.6	10	1.5
15	11.3	19.3	15	1.9	14	1.4
19	11.1	25.0	19	1.6	19	1.3
24	11.1	25.4	24	1.5	24	1.7
28	11.0	25.5	28	1.4	27	1.6
33	11.0	27.4	33	1.3	32	1.4
38	10.9	28.5	37	1.3	36	1.6
42	10.9	28.6	41	1.1	39	1.2

STATION: Buoy 7 DATE: April 27, 1961

TIME:	0200		0126		0151	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.4	10.0	0	2.8 E	0	2.7 E
5	11.5	14.7	5	2.2	5	2.4
10	11.5	16.0	10	1.6	10	1.7
15	11.4	21.2	15	1.3	14	1.5
19	11.3	23.4	20	1.3	19	1.6
24	11.2	24.6	24	1.5	23	1.8
28	11.2	25.4	28	1.5	26	1.4
33	11.1	25.7	32	1.1	33	1.0
38	11.1	25.7	37	0.9	37	0.5
41	11.1	25.9	40	0.9	40	0.5

STATION: Buoy 7 DATE: April 27, 1961

TIME:	0300		0225		0253	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.5	10.0	0	2.6 E	0	2.4 E
5	11.6	14.2	5	2.2	5	2.0
10	11.6	14.5	10	1.8	10	1.6
15	11.5	15.2	15	1.5	15	1.4
19	11.5	18.3	19	1.3	20	1.4
24	11.5	19.0	24	1.4	24	1.5
29	11.4	20.8	29	1.1	29	1.1
34	11.3	23.1	34	0.9	34	0.8
38	11.3	23.1	39	0.5	39	0.3

STATION: Buoy 7 DATE: April 27, 1961

TIME:	0400		0323		0352	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.7	11.0	0	2.2 E	0	2.0 E
5	11.6	12.3	5	1.7	5	1.4
10	11.6	14.2	10	1.4	10	1.0
15	11.5	19.0	15	0.9	15	0.9
20	11.4	20.6	20	1.0	20	0.6
25	11.4	21.5	25	0.9	25	0.2
30	11.4	21.7	30	0.5	30	0.2
35	11.4	22.3	34	0.3	35	0.2
39	11.3	22.4	39	0.1	39	0.1

STATION: Buoy 7 DATE: April 27, 1961

TIME:	0456		0422		0451	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.4	7.2	0	1.7 E	0	1.3 E
5	11.7	9.8	5	1.2	5	0.9
10	11.6	15.3	10	0.8	10	0.2
15	11.6	17.1	15	0.5	15	0.2
20	11.5	18.6	20	0.2	20	0.3 F
25	11.4	21.1	25	0.2	25	0.4
30	11.4	21.6	30	0.2	30	0.5
35	11.3	22.5	35	0.2	35	0.4
40	11.3	23.3	39	0.2	38	0.5

STATION: Buoy 7 DATE: April 27, 1961

TIME:	0555		0520		0550	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.6	7.5	0	0.7 E	0	0.4 E
5	11.6	9.0	5	0.5	5	0.1
10	11.6	15.0	10	0.2	10	0.7 F
15	11.5	16.4	15	0.3 F	15	0.8
20	11.4	19.1	20	0.7	20	0.8
25	11.4	20.3	25	0.8	25	0.7
30	11.3	21.5	30	0.7	30	0.4
35	11.3	21.8	35	0.6	35	0.3
37	11.3	22.5	38	0.6	38	0.4

STATION: Buoy 7 DATE: April 27, 1961

TIME:	0655		0623		0650	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.5	9.7	0	0.3 F	0	0.7 F
5	11.5	13.2	5	0.6	5	1.0
10	11.3	19.8	10	0.8	10	0.9
15	11.3	20.4	15	1.0	15	1.1
20	11.3	20.9	20	1.1	20	1.3
25	11.3	21.6	25	0.9	25	1.2
30	11.3	21.7	30	0.9	30	1.0
35	11.3	21.8	35	0.4	35	0.7
37	11.3	21.8	37	0.4		

STATION: Buoy 7 DATE: April 27, 1961

TIME:	0755		0726		0750	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.3	15.8	0	1.1 F	0	1.1 F
5	11.1	19.9	5	1.5	5	1.5
10	11.1	21.6	10	0.9	10	1.1
15	10.8	27.4	15	0.7	15	0.9
20	10.6	27.8	20	0.9	20	1.1
25	10.6	28.0	25	1.2	25	1.2
30	10.6	28.1	30	1.3	30	1.1
34	10.6	28.2	35	1.1	35	0.9
37	10.6	28.3	38	1.0		

STATION: Buoy 7 DATE: April 27, 1961

TIME:	0855		0822		0850	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.4	16.2	0	0.9 F	0	0.5 F
5	10.6	28.5	5	0.9	5	0.9
10	10.6	28.6	10	1.1	10	0.9
15	10.6	28.7	15	1.2	15	0.9
20	10.6	28.8	20	1.1	20	1.0
25	10.6	28.8	25	1.1	25	1.3
30	10.6	28.8	30	1.0	30	1.3
35	10.6	29.1	35	0.9	35	0.9
37	10.6	29.1	36	0.6	36	0.8

STATION: Buoy 7 DATE: April 27, 1961

TIME:	0941		0922		0952	
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.0	25.9	0	0.5 F	0	0.5 F
5	10.6	29.1	5	0.8	5	0.7
10	10.6	29.2	10	0.8	10	0.7
15	10.6	29.2	15	0.8	15	0.6
20	10.6	29.3	20	0.9	20	0.7
25	10.6	29.4	25	1.0	25	0.7
30	10.6	29.5	30	0.9	30	0.7
35	10.6	29.5	35	0.7	35	0.7
40	10.6	29.5	38	0.6	40	0.5
					43	0.3

STATION: Buoy 7 DATE: April 27, 1961

TIME:	1022		1017			
Depth (feet)	Temp. (°C)	Sal. (°/oo)	Depth (feet)	Vel. (knots)	Depth (feet)	Vel. (knots)
0	11.0	27.6	0	0.2 F		
5	10.6	29.3	5	0.3		
10	10.6	29.4	10	0.4		
15	10.6	29.5	15	0.3		
20	10.6	29.6	20	0.3		
25	10.6	29.6	25	0.5		
30	10.6	29.6	30	0.4		
35	10.6	29.6	35	0.3		
40	10.6	29.7	40	0.3		
45	10.6	29.7				