U. S. DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Current velocities in Sagadahoc Bay, Maine

by

C. L. Knox and W. H. Bradley

June 11, 1954

This preliminary report and accompanying map is being released without editorial or technical review to conform with official standards and nomenclature.

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U. S. Geological Survey

During the summer of 1953 continuous velocities were obtained through a tidal cycle at each of the 17 stations indicated on the accompanying map. Tidal cycle as used in this report applies to the interval of 4 to 6 hours when the tidal flat at a given station is submerged. The velocities were measured by recording current meters set 0.1 ft., 1.0 ft., and 3.0 ft. above the bottom. Velocities at 0.1 ft. above the bottom are the bottom velocities discussed in this report. Velocities at the other heights were used for comparison.

An automatic recorder gave a continuous graph of the various tides and was used to obtain the stage (water-surface elevation) at any given time. The datum of the water-stage recorder was about 5.4 feet below mean sea level so that the stages shown by the recorder are about 5.4 feet higher than they would be were they converted to mean sea level datum.

The observed velocities for one station can not be compared directly with those observed for another station because the velocities were measured at one station only during a given tidal cycle. Therefore, in order to compare velocities in the different parts of the bay, it was necessary to adjust them to a common tide.

Many factors affect the velocities throughout the bay. Among the most important are character and topography of the bottom, wind, waves, and rate of rise of water in the bay.

The effects of the character and topography of the bottom are reflected directly in the velocities measured at each station.

Available data are not sufficient to make adjustments for wind and waves. Nevertheless, winds of different directions and velocities and waves of different characteristics occurred during the various runs so that the results do include these effects.

The rate of rise of tide is the difference in water surface elevation for any given period of time and is obtained from the recorder chart. The mean velocity across any section of the bay is a function of the rate of rise of the tide, the change in volume in the bay above the section, and the cross-sectional area of the section. The mean velocity includes the effects of wind, waves, and character and topography of the bottom averaged across the whole section. Therefore, the computed mean velocity is the best means of reducing the observed data to a comparable basis so that results for the various stations may be compared.

As indicated on the accompanying map, stations 1-3 are on sections A-A; 4-6 are on sections B-B; 7-9 are on section C-C; 10-12, 16 are on section D-D; 13-15 are on section E-E; 17 is between sections A-A and B-B.

Tables 1-10 are volume and cross-sectional area tables which were computed for each section from 0.5 ft. contours on the accompanying map.

Figures 1-17 show for each station the graph of the water surface during a complete tidal cycle; observed bottom velocities (B), computed mean velocities (M), and a plot of the ratio B/M against percent of depth at high tide. The graph of the water surface was obtained directly from the recorder chart. The observed bottom velocities (B) were measured by a rated Price pygmy current meter and are shown in 15-minute intervals of time. The computed mean velocities (M) are shown in bar graphs and are the velocities for the section on which the respective station is located. These velocities were computed by dividing the total volume passing the section in 15 minutes by the mean cross sectional area of the section. The volume passing the section is the difference in volume of water above the station which is obtained from the volume table if the stages at start and end of period are known. The stages were taken from the stage recorder chart. The cross section area is the mean of the area at the start and end of the period, and was obtained from the area tables. The ratio B/M, which is the observed bottom velocity at any given time divided by the computed mean velocity for that time is plotted against percent of depth at high tide. In general, the points line up fairly well, although there is some scatter. In some cases a single curve could be used for both rising and falling stages. In other cases there was too much spread between points so that it was necessary to draw separate curves for rising and falling stages.

We now have the factors to compute bottom velocities for the 17 stations for any tide if the graph of stage of the tide is known. Mean velocities for the appropriate section are computed as explained above from the stage graph and volume and area tables. These velocities are then converted to bottom velocities at a specific station by use of ratios obtained from the B/M curve for that station. Bottom velocities were computed in this manner for station 8 for the low tidal range of August 18 and for the high tidal range of August 25-26. The results are plotted on Figure 18 together with the velocities measured during the tide of August 18 and the stage graph for each tide.

A high and low tidal range were used to show the probable magnitude of the variation of the velocities at a given station. In general, the velocities for the higher tide were higher than the others and those for the lower tide were smaller. However, the rate of change of stage for increments of time were not always higher during the high tide and this explains the higher individual velocities for the measured tide shown on the graph.

Figure 19 is a plot of the computed bottom velocities for the low tide of August 18 for stations 8, 13, and 15 showing the relative magnitude of difference in velocities from station to station during the same tide.

Since the bottom velocities are a function of the mean velocity throughout a cross-section of the bay, general comparisons of the average velocities for the different sections give an index of the differences in mean bottom velocities for various tides. The average velocity for the different sections represents the average of the instantaneous mean velocities during a tidal cycle.

Table 11 lists the computed average velocities for each of the 5 sections for the high tidal range of August 25-26, 1953, and the low tidal range of August 18, 1953. The ratios shown are the velocities for the high tidal range divided by the respective velocities for the low tidal range. The ratios range from 1.23 for section E-E to 1.36 for section D-D with an average ratio of 1.29. This indicates that the average velocities throughout the bay were about 29 percent higher during the high tidal range than those during the low tidal range.

Figure 20 shows the ratios of the average velocity for any tide divided by the average velocity for a 7.7 ft. tide at the individual stations plotted against maximum gage heights for various tidal ranges. The ratios obtained from this curve can be used to reduce the average velocity for any tide (peak stage) to a common tide of 7.7 ft.

Table 12 lists the peak stage of the tide that occurred during the velocity measurements at each of the 17 stations, the mean bottom velocity measured at each station, the ratio (from figure 20), and the computed mean bottom velocity for each station for the low tidal range of August 18, 1953. These velocities have thus been adjusted to a common tide and indicate the relative differences in mean bottom velocities between stations.

Bottom velocities in the inter-tidal part of Sagadahoc Bay

The following discussion is necessarily general owing to the limitation of the data upon which it is based.

All the water entering the bay comes from the ocean, since there is practically no fresh water inflow. Thus the volume of water entering and leaving the bay varies directly with the tidal range. The velocities are a function of the rate of change of tide. Local conditions affect the velocity distribution, but the effect is the same for different tides. The shape of the bay is such that water flows into all parts of the bay without changing directions significantly, except that entering the portion known as Bedroom Bay.

On the basis of data obtained during July and August 1953, bottom velocities measured at the 17 points gave similar patterns. The velocities at the start of incoming tide were the highest recorded during the tidal cycle and ranged from 0.82 f.p.s. to 0.35 f.p.s. The velocities decreased rapidly and then leveled off, reaching a minimum around the change of tide. Minimum velocities ranged from zero to 0.15 f.p.s. Measurable velocities were recorded at all but one station. The velocities then increased after the turn of the tide and reached another peak as the water drained off the flat. These peak velocities as the water drained off ranged from 0.20 f.p.s. to 0.58 f.p.s. The velocities at start of a tidal cycle averaged about 25 percent higher than those near the end.

The velocities varied rather uniformly throughout the bay. Velocities in Bedroom Bay were about half those in other parts of the bay. The velocities in the upper end of the main part of the bay were about 35 percent lower than those farther out in the bay.

The average velocities varied directly with the range of the tide. The average velocities for the tide of Aug. 18, 1953 (7.7 ft.) were 30 percent lower than those for the tide of Aug. 25-26, 1953 (11.2 ft.).

Flow into and from the bay varied at a fairly uniform rate. However, there were times, especially when there was a pronounced swell running, when the water moved in surges. At these times the current moved alternately in and out, especially near the turn of the tide. The recorded velocity was the resultant of the two velocities.

In general, the initial and final velocities were influenced greatly by local conditions but these influences prevailed for only short intervals of time. During the rest of the tidal cycle the velocities, except for those in Bedroom Bay, were remarkably uniform.

Table 11. - Computed average velocities for the various sections

Section	Computed Average Velocity		Ratio
	High Tidal Range	Low Tidal Range	High / Low
A-A	0.153	0.118	1.30
B-B	.294	.230	1.28
C-C	.403	.310	1.30
D-D	.399	.292	1.36
E-E	.079	.064	1.23
		Average	1.29

Table 12. - Mean bottom velocity adjusted to low tidal range (7.7 ft.) of August 18, 1953

Station	Maximum Stage of Tide	Mean Bottom Velocity Observed	Ratio of Mean Bottom Velocity Observed to that at 7.7 ft. Tide	Computed Mean Bottom Velocity for Low Tidal Range
1	8.55	0.23	1.07	0.21
2	8.65	.20	1.06	.19
3	8.7	.21	1.08	.19
4	8.5	.31	1.07	.29
5	10.15	.22	1.20	.18
6	10.4	.30	1.22	.25
7	10.3	.31	1.22	.25
8	9.9	.24	1.18	.20
9	7.8	.23	1.01	.23
10	8.1	.21	1.03	.20
11	8.4	.33	1.06	.31
12	8.85	.32	1.09	.29
13	9.0	.17	1.11	.15
14	8.8	.14	1.09	.13
15	8.9	.095	1.10	.09
16	9.0	.17	1.11	.15
17	9.0	.30	1.11	.27

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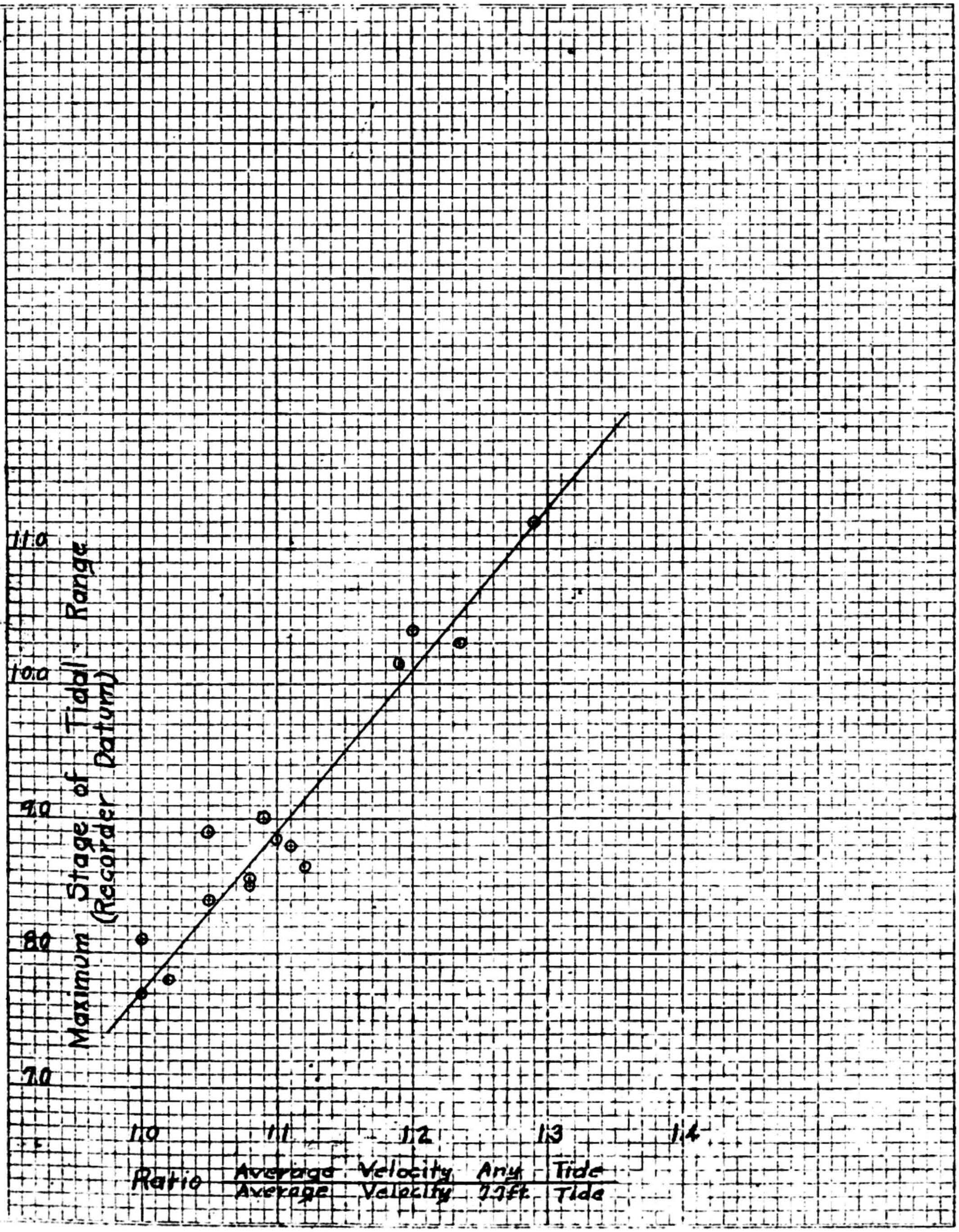
Fig.20.-Relation of Average Velocity to Maximum Stage of Tide



9-230

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Table 1

Volume, in Thousand Cubic Feet, above Section A-A

Stage (Feet)	Tenths .0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0										
1										
2										
3							0	7	14	22
4	32	42	52	62	72	97	122	147	1.72	197
5	266	315	374	433	492	580	668	756	844	934
6	1030	1120	1220	1310	1410	1510	1610	1710	1810	1910
7	2010	2110	2210	2310	2410	2510	2610	2720	2820	2920
8	3020	3120	3230	3330	3430	3530	3640	3740	3850	3950
9	4060	4160	4260	4370	4470	4580	4680	4790	4890	5000
10	5110	5210	5320	5420	5530	5640	5750	5850	5960	6070
11	6180	6290	6390	6500	6610	6720	6830	6930	7040	7150

9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. Washington ....
District ....

Table 2

Area in Square Feet - Recorder Datum - Section A-A

Stage	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0										
1.0										
2.0										
3.0							0	3	6	9
4.0	22	35	48	61	75	196	318	440	562	685
5.0	835	985	1140	1280	1430	1590	1750	1900	2060	2220
6.0	2380	2540	2700	2860	3020	3180	3340	3510	3670	3830
7.0	3990	4160	4320	4490	4650	4820	4980	5150	5310	5480
8.0	5650	5810	5980	6140	6310	6480	6640	6810	6970	7140
9.0	7310	7470	7640	7800	7970	8140	8300	8470	8630	8800
10.0	8970	9130	9300	9460	9630	9800	9960	10130	10290	10460
11.0	10630	10790	10960	11120	11290	11460	11620	11790	11950	12120

9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. Washington ________ District ________

Table 3

(Recorder datum)

Volume, in Thousand Cubic Feet, above Section B-B

Stage Feet	Tenths .0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0										
1										
2					0	8	16	24	32	40
3	62	84	106	128	150	198	246	294	342	390
4	502	614	726	838	950	1130	1300	1480	1650	1830
5	2050	2280	2500	2730	2950	3200	3450	3710	3960	4210
6	4470	4720	4980	5230	5490	5750	6010	6270	6530	6790
7	7050	7320	7580	7850	8110	8380	8650	8910	9180	9450
8	9720	9990	10270	10540	10810	11090	11360	11640	11910	12190
9	12470	12750	13030	13310	13590	13870	14160	14440	14730	15010
10	15290	15580	15860	16150	16430	16710	17000	17280	17570	17850
11	18130	18420	18700	18990	19270	19550	19840	20120	20410	20690

9-210

UNITED STATES
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GEOLOGICAL SURVEY

File No. Washington .... District ....

Table 4

Area in Square Feet - Recorder Datum - Section B-B

Stage Feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0										
1										
2					0	7	14	21	28	35
3	55	70	95	115	135	242	349	456	563	670
4	850	1030	1210	1390	1570	1750	1930	2110	2290	2470
5	2600	2830	3010	3190	3370	3550	3730	3910	4090	4270
6	4450	4630	4810	4990	5170	5350	5530	5710	5890	6070
7	6250	6430	6610	6790	6970	7150	7330	7510	7690	7870
8	8050	8230	8410	8590	8770	8950	9130	9310	9490	9670
9	9850	10030	10210	10390	10570	10750	10930	11110	11290	11470
10	11650	11830	12010	12190	12370	12550	12730	12910	13090	13270
11	13450	13630	13810	13990	14170	14350	14530	14710	14890	15070

9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington .... District ....

Table 5

(Recorder datum)

Volume, in thousand Cubic Feet, above Section C-C

Stage Feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
	Tenths									
0										
1					0	1	2	3	4	5
2	8	11	14	17	20	35	50	65	80	95
3	129	163	197	231	265	355	440	535	625	715
4	905	1100	1280	1480	1660	1920	2180	2440	2700	2960
5	3280	3580	3900	4200	4520	4860	5200	5540	5880	6220
6	6560	6900	7240	7580	7960	8320	8670	9020	9380	9740
7	10090	10440	10800	11160	11500	11860	12220	12580	12940	13300
8	13660	14020	14380	14740	15100	15470	15840	16210	16580	16950
9	17320	17690	18060	18430	18800	19180	19560	19940	20320	20700
10	21080	21460	21840	22220	22600	22980	23360	23740	24120	24500
11	24880	25260	25640	26020	26400	26780	27160	27540	27920	28300

9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington ....
District ....

Table 6

Area in Square Feet - Recorder Datum - Section C-C

Stage Feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0										
1										
2										85
3	125	165	205	245	285	385	485	585	685	790
4	956	1120	1290	1450	1620	1810	2000	2190	2380	2570
5	2760	2950	3140	3330	3520	3710	3900	4090	4280	4470
6	4660	4850	5040	5230	5430	5620	5820	6010	6210	6400
7	6590	6790	6980	7180	7370	7570	7770	7970	8170	8370
8	8570	8770	8970	9170	9370	9570	9770	9970	10170	10370
9	10570	10770	10970	11170	11370	11570	11770	11970	12170	12370
10	12570	12770	12970	13170	13370	13570	13770	13970	14170	14370
11	14570	14770	14970	15170	15370	15570	15770	15970	16170	16370

9-230

Table 7

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. Washington ______ District ______

(Recorder datum)

Volume, in Thousand Cubic Feet, above Section D-D

Stage Feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0										
1										6
2	10	14	18	22	27	73	119	165	211	255
3	370	485	600	715	830	1040	1260	1470	1690	1900
4	2250	2600	2960	3310	3660	4100	4550	4990	5440	5880
5	6380	6870	7370	7860	8360	8890	9420	9950	10480	11010
6	11550	12080	12620	13150	13690	14230	14770	15310	15850	16390
7	16935	17480	18020	18570	19120	19660	20210	20760	21310	21860
8	22420	22970	23520	24080	24630	25190	25750	26310	26870	27430
9	28000	28560	29120	29690	30260	30830	31400	31970	32540	33110
10	33680	34260	34840	35410	35980	36560	37140	37720	38300	38880
11	39460	40050	40630	41220	41800	42390	42980	43570	44160	44750

9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington .... / District ....

Table 8

Area in Square Feet - Recorder Datum - Section D-D

Stage Feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0										
1										0
2	7	14	21	28	35	147	259	371	483	595
3	744	893	1040	1190	1340	1060	1770	1990	2200	2420
4	2690	2960	3240	3510	3780	4060	4340	4630	4910	5190
5	5480	5760	6050	6330	6620	6910	7200	7490	7780	8070
6	8360	8650	8940	9230	9520	9810	10100	10390	10680	10970
7	11260	11650	11840	12130	12420	12710	13000	13290	13580	13870
8	14160	14450	14740	15030	15320	15610	15900	16190	16480	16770
9	17060	17350	17640	17930	18220	18510	18800	19090	19380	19670
10	19960	20250	20540	20830	21120	21410	21700	21990	22280	22570
11	22860	23160	23440	23730	24020	24310	24600	24890	25180	25470

9-230

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

File No. { Washington .... District ....

Table 9

Area in Square Feet - Recorder Datum - Section E-E

Stage Feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0										
1										
2										
3			0	3	7	38	69	100	130	161
4	235	309	383	457	533	636	739	842	945	1050
5	1170	1290	1410	1530	1650	1770	1890	2010	2130	2250
6	2370	2490	2610	2730	2850	2970	3090	3220	3340	3460
7	3580	3700	3830	3950	4070	4190	4320	4440	4570	4690
8	4810	4940	5060	5190	5310	5440	5560	5690	5810	5940
9	6070	6190	6320	6440	6570	6700	6830	6950	7080	7210
10	7340	7470	7590	7720	7850	7980	8110	8240	8370	8500
11	8630	8760	8890	9020	9150	9280	9410	9540	9670	9800

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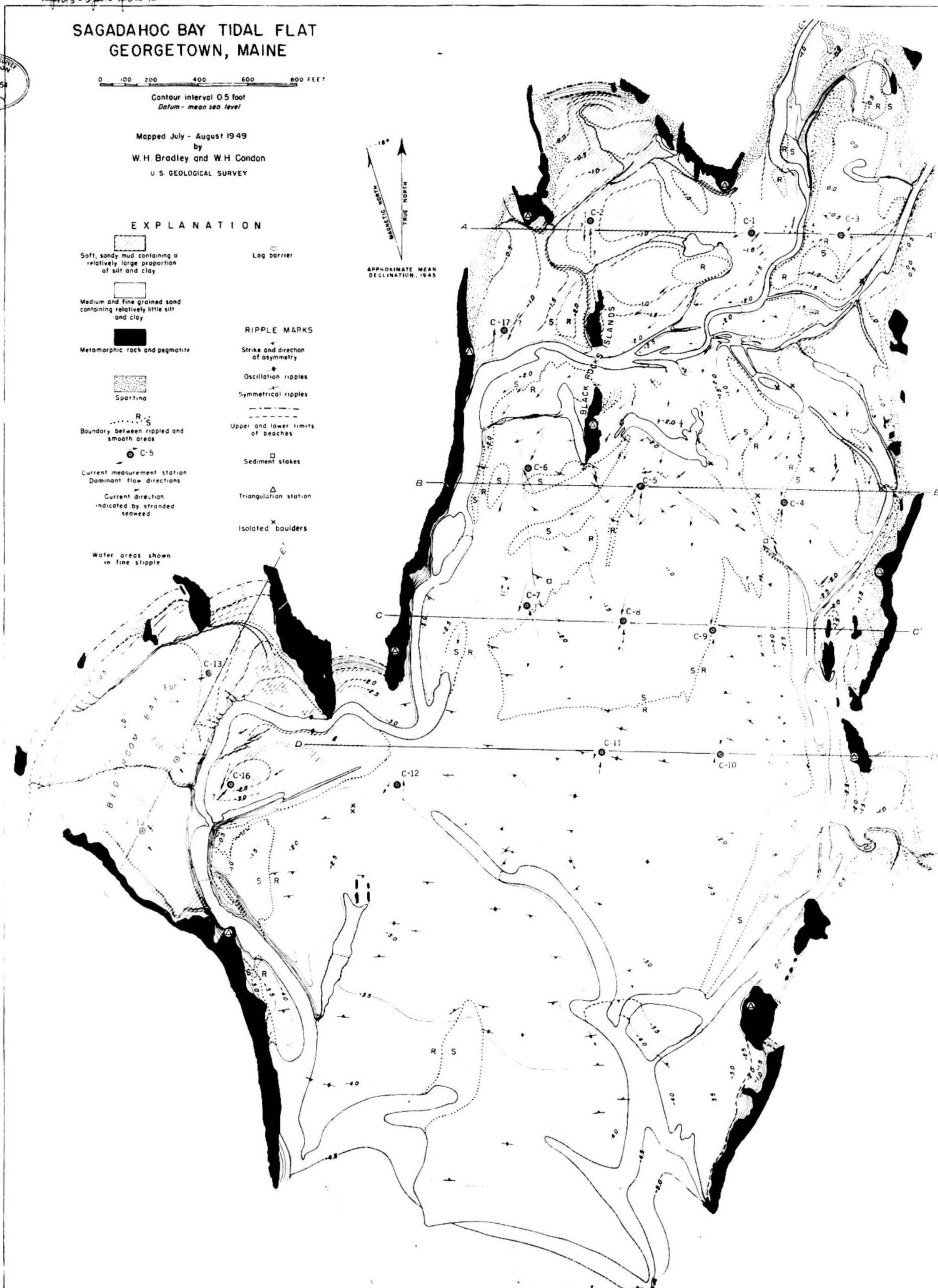
Table 10

(Recorder datum)

Volume, in Thousand Cubic Feet, above Section E-E

Stage, Feet	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
0										
1										
2										
3			0	0.3	0.6	3	6	8	11	14
4	24	35	45	56.	66.	89	112	135	158	182
5	215	248	281	314	347	380	413	447	481	523
6	559	595	631	667	705	742	779	816	853	890
7	928	966	1000	1040	1080	1120	1160	1200	1240	1280
8	1320	1360	1400	1440	1480	1520	1560	1600	1640	1680
9	1720	1760	1810	1850	1890	1930	1970	2020	2060	2100
10	2140	2190	2230	2280	2320	2360	2410	2450	2500	2540
11	2580	2630	2670	2720	2760	2800	2850	2890	2940	2980


SAGADAHOC BAY TIDAL FLAT
GEORGETOWN, MAINE
0 100 200 400 600 800 FEET
Contour interval 0.5 foot
Datum - mean sea level
Mapped July - August 1949
by
W. H. Bradley and W. H. Condon
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EXPLANATION
Soft, sandy mud containing a relatively large proportion of silt and clay
Medium and fine grained sand containing relatively little silt and clay
Metamorphic rock and pegmatite
Spartina
Boundary between rippled and smooth areas
Current measurement station Dominant flow directions
Current direction indicated by stranded seaweed
Water areas shown in fine stipple
Log barrier
RIPPLE MARKS
Strike and direction of asymmetry
Oscillation ripples
Symmetrical ripples
Upper and lower limits of beaches
Sediment stakes
Triangulation station
Isolated boulders
MAGNETIC NORTH
TRUE NORTH
APPROXIMATE MEAN DECLINATION, 1945
BLACK ROCKS ISLANDS
BEDROOM BAY
A
A'
B
B'
C
C'
D
C-1
C-2
C-3
C-4
C-5
C-6
C-7
C-8
C-9
C-10
C-11
C-12
C-13
C-16
C-17

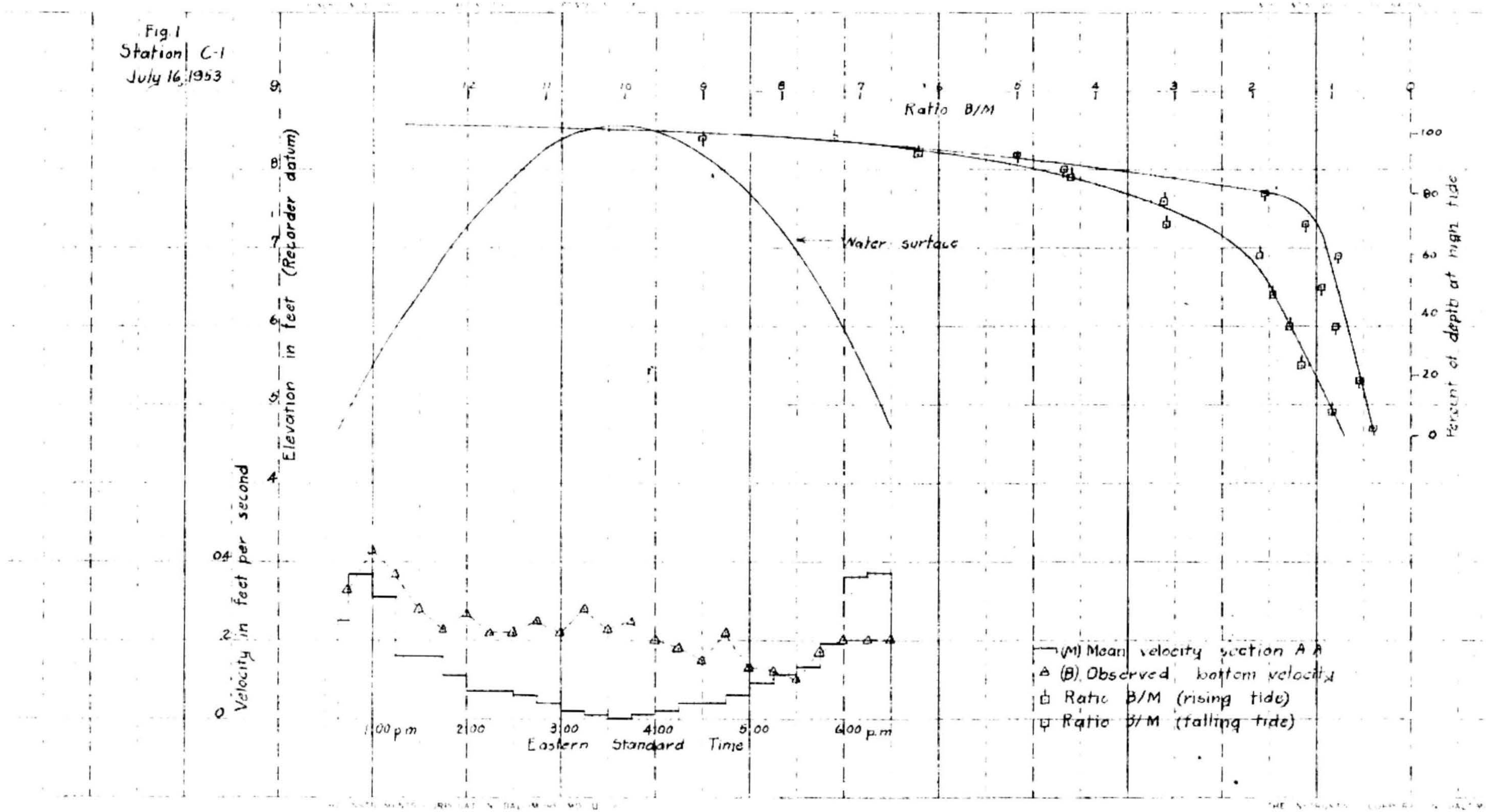

Station C-1
July 16, 1953
Ratio B/M
Water surface
Elevation in feet (Recorder datum)
Velocity in feet per second
Percent of depth at high tide
1:00 pm
2:00
3:00
4:00
5:00
6:00 p.m
Eastern Standard Time
(M) Mean velocity section A A
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

Fig. 1

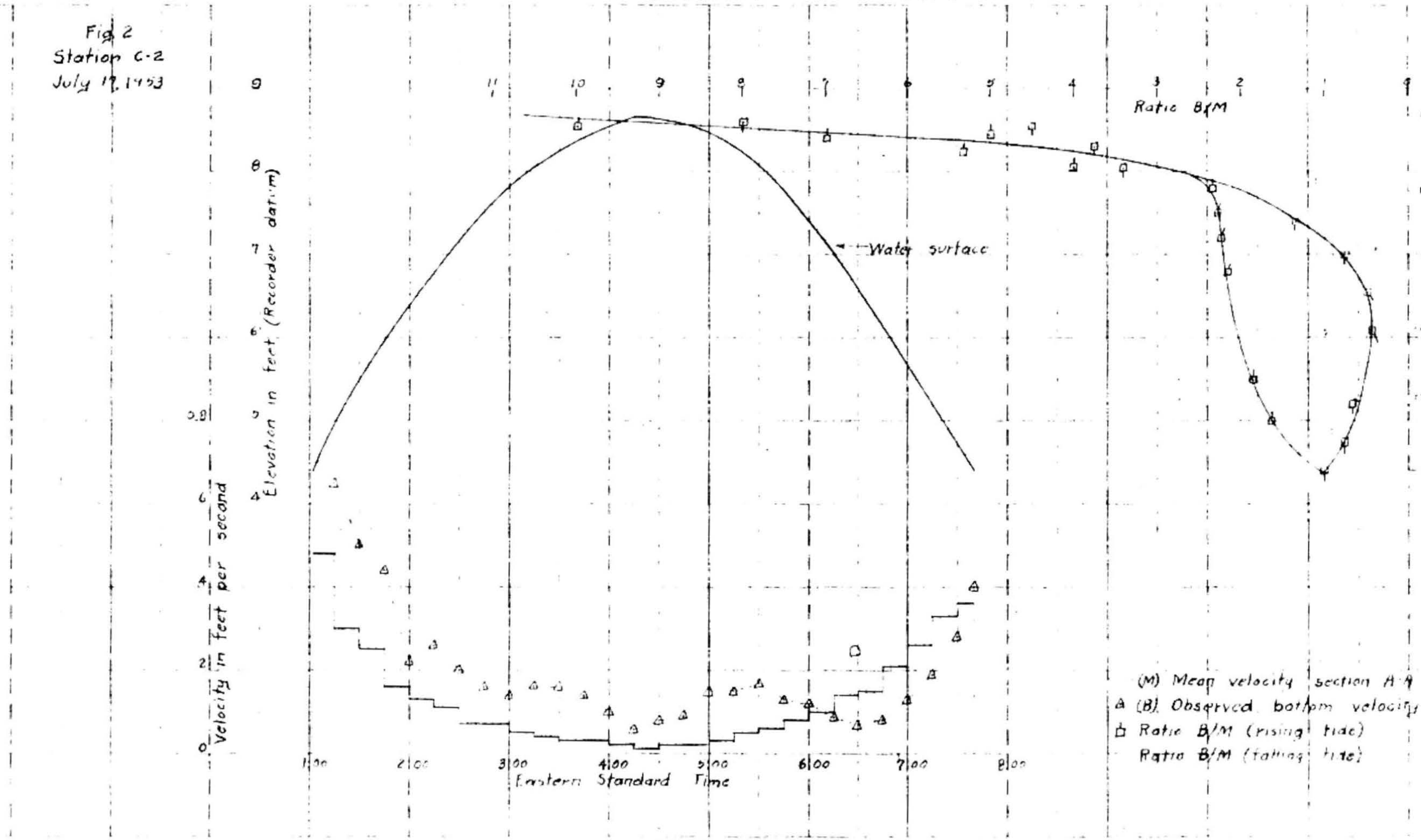


Fig 2
Station C-2
July 17, 1953
Ratio B/M
Water surface
Elevation in feet (Recorder datum)
Velocity in feet per second
Percent of depth at high tide
Eastern Standard Time
(M) Mean velocity section A-A
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

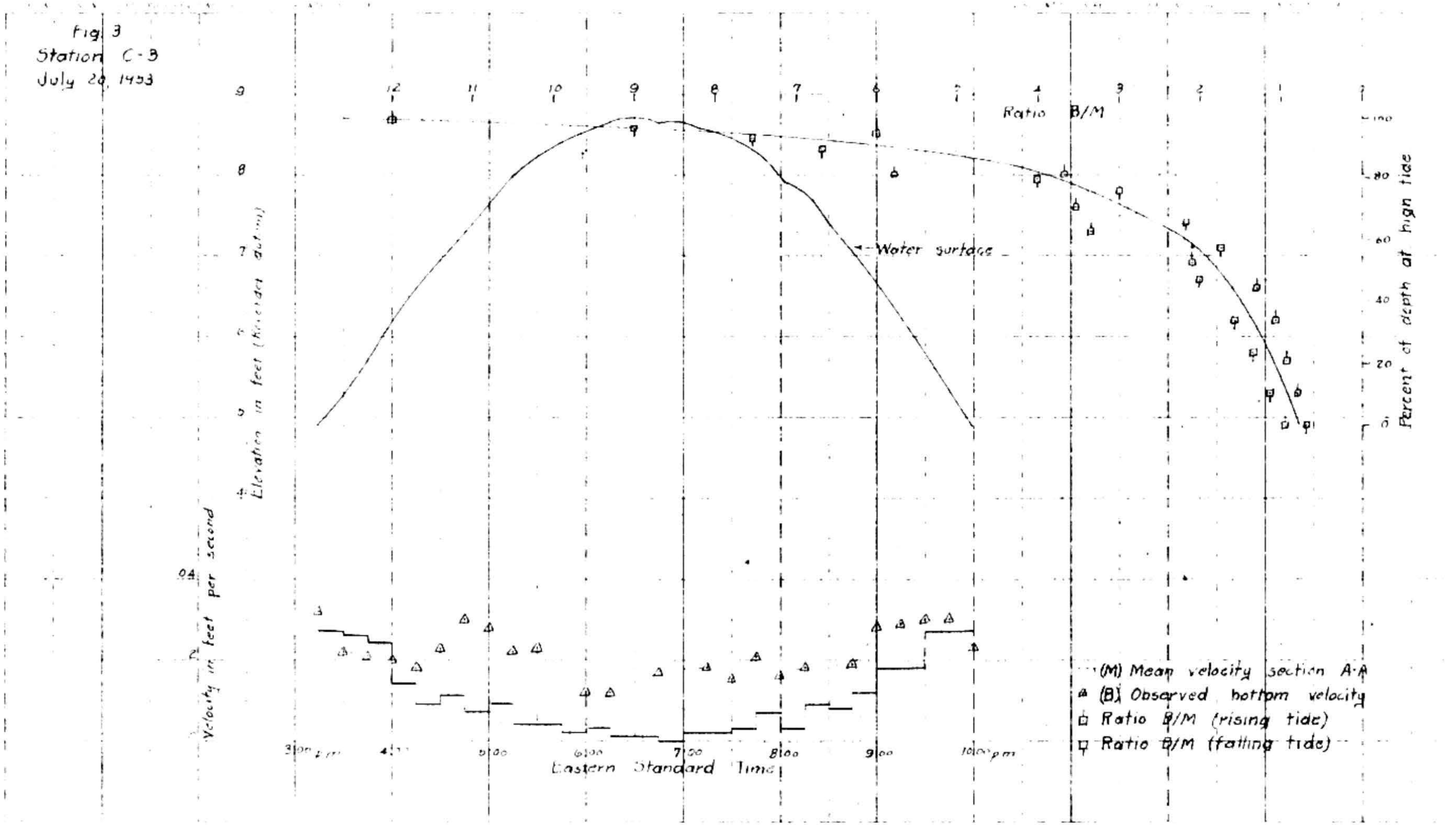


Fig. 3
Station C-3
July 20, 1953
Ratio B/M
Water surface
Elevation in feet
Percent of depth at high tide
Velocity in feet per second
3:00 p.m.
4:00
5:00
6:00
7:00
8:00
9:00
10:00 p.m.
Eastern Standard Time
(M) Mean velocity section A-A
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

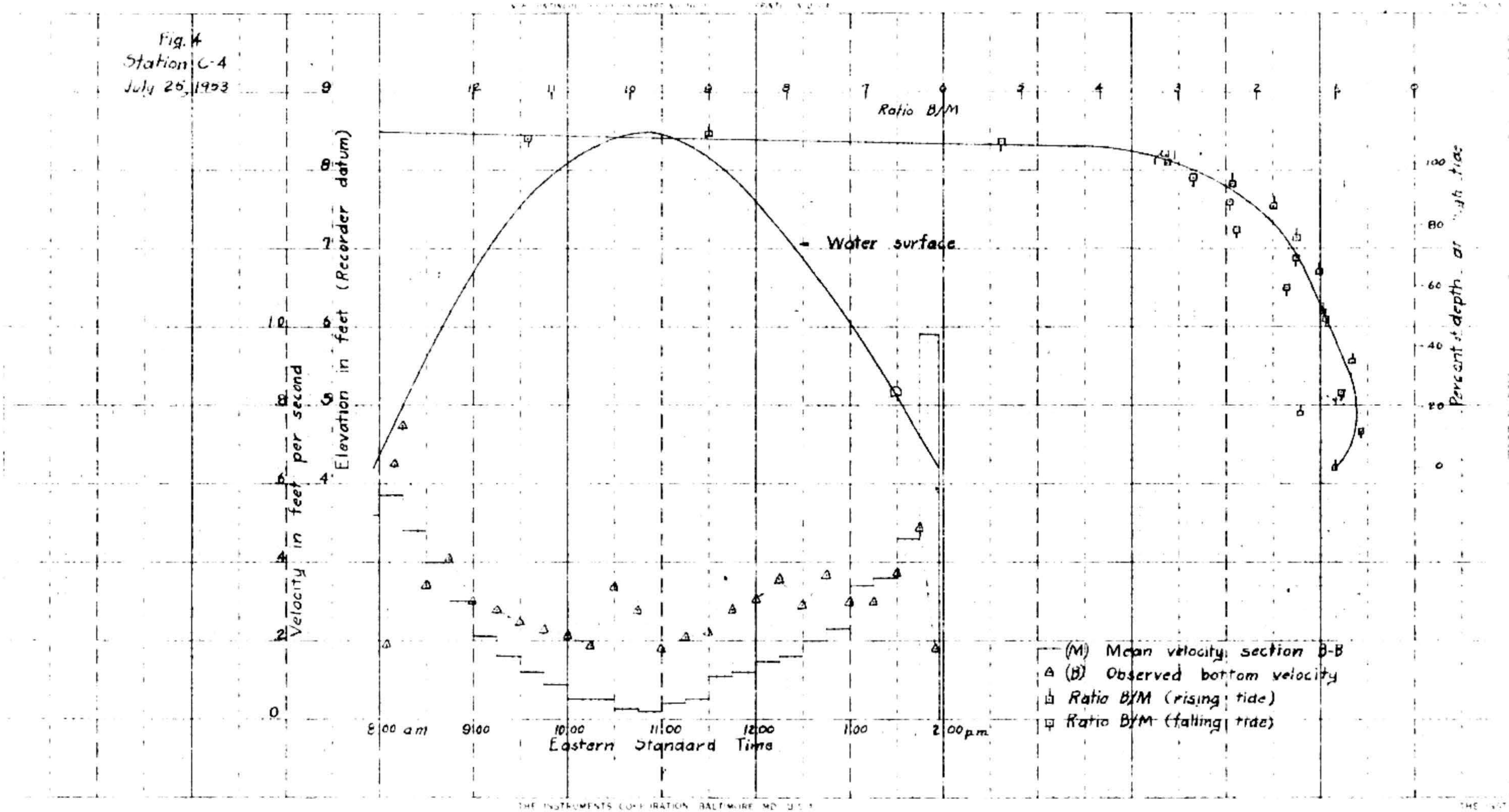


Fig. 4
Station C-4
July 26, 1953
Ratio B/M
Elevation in feet (Recorder datum)
Velocity in feet per second
Percent of depth at high tide
Water surface
Eastern Standard Time
8:00 am
9:00
10:00
11:00
12:00
1:00
2:00 pm
(M) Mean velocity section B-B
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

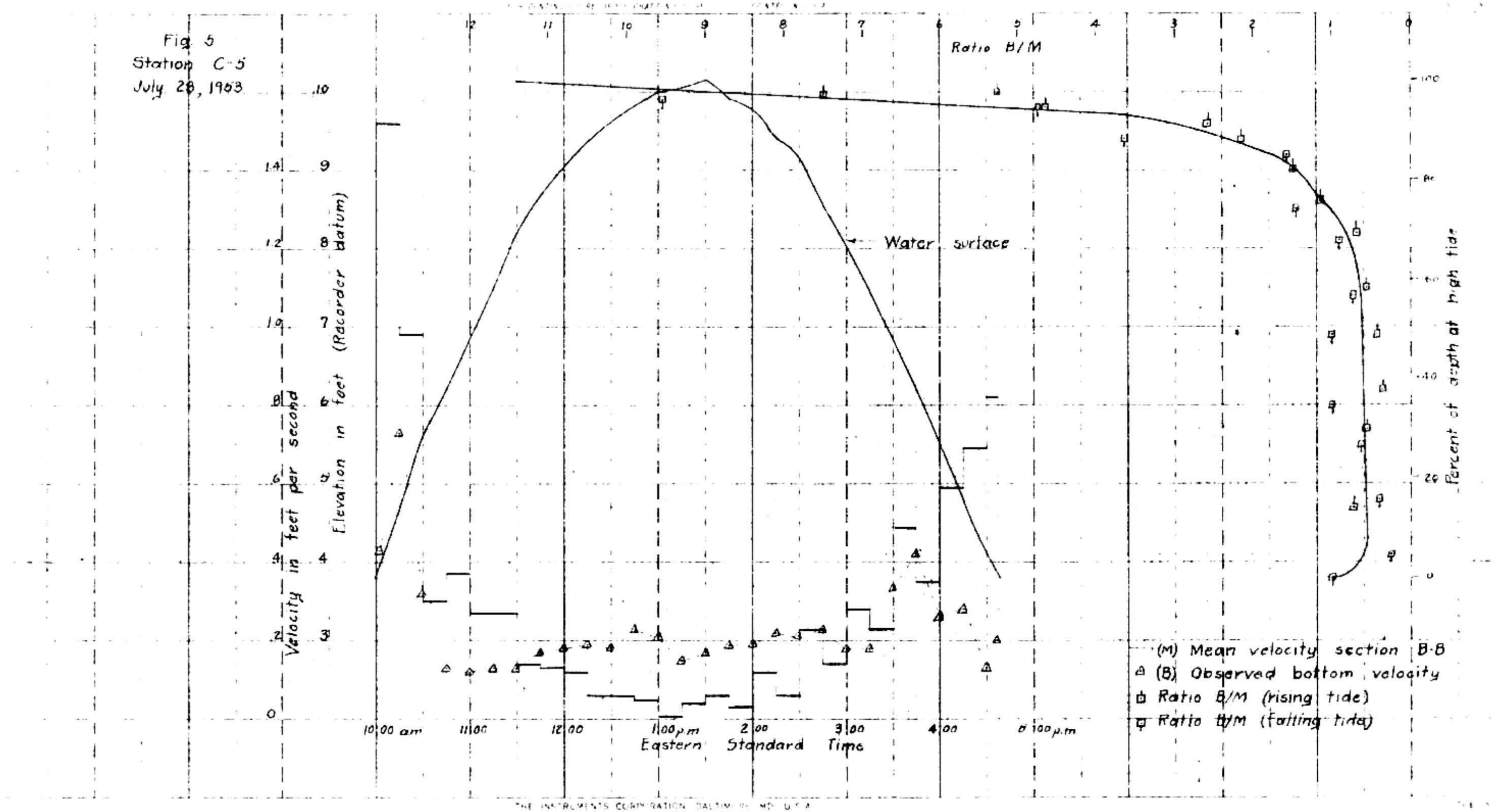


Fig. 5
Station C-5
July 28, 1953
Ratio B/M
12
11
10
9
8
7
6
5
4
3
2
1
0
Water surface
Velocity in feet per second
Elevation in feet (Recorder datum)
Percent of depth at high tide
10:00 am
11:00
12:00
1:00 p.m
2:00
3:00
4:00
5:00 p.m
Eastern Standard Time
(M) Mean velocity section B-B
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)
THE INSTRUMENTS CORPORATION BALTIMORE MD U.S.A.

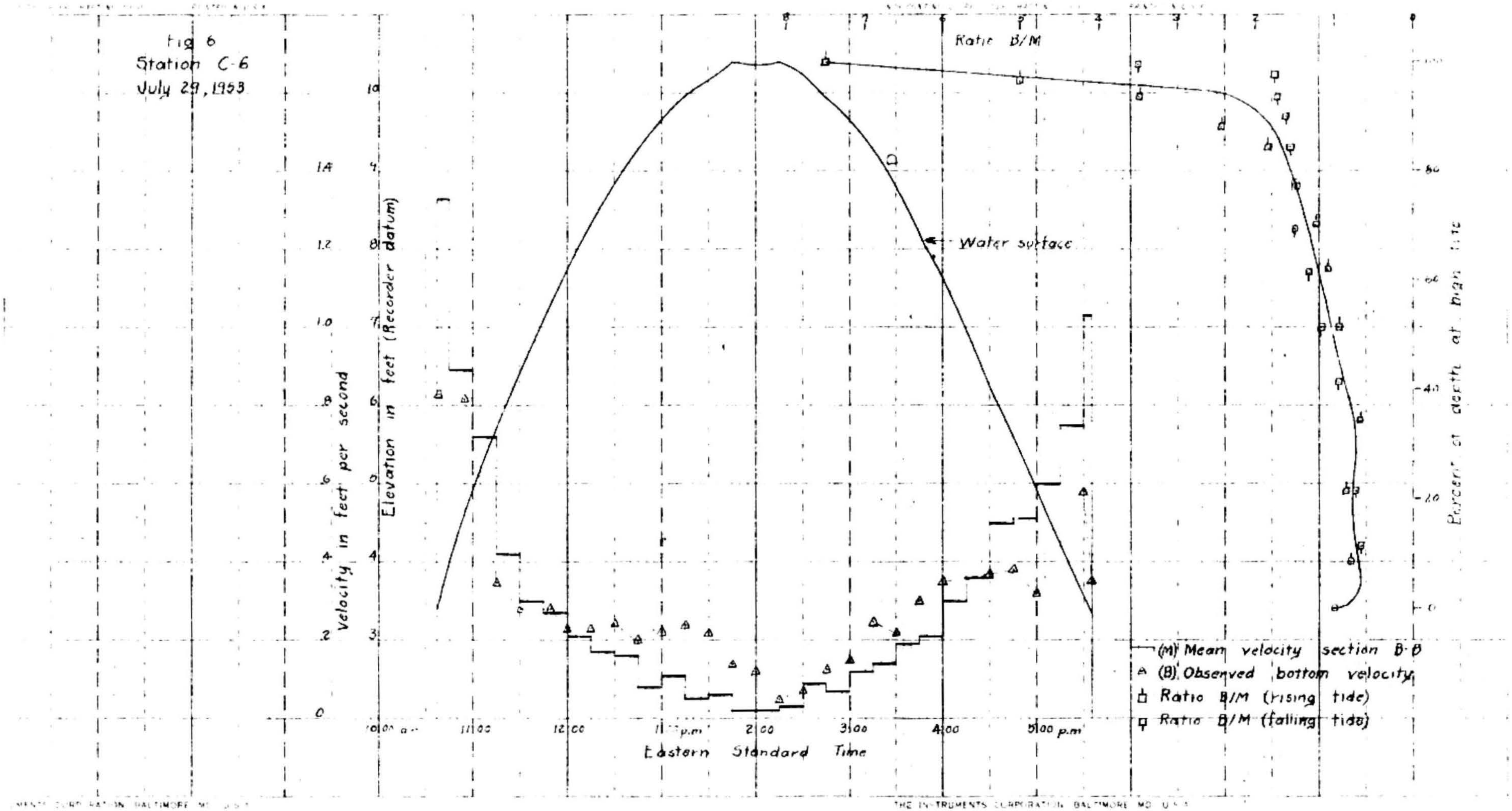


Fig 6
Station C-6
July 29, 1953
Ratio B/M
Water surface
Velocity in feet per second
Elevation in feet (Recorder datum)
Percent of depth at high tide
Eastern Standard Time
10:00 a.m.
11:00
12:00
1:00 p.m.
2:00
3:00
4:00
5:00 p.m.
(M) Mean velocity section B-B
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

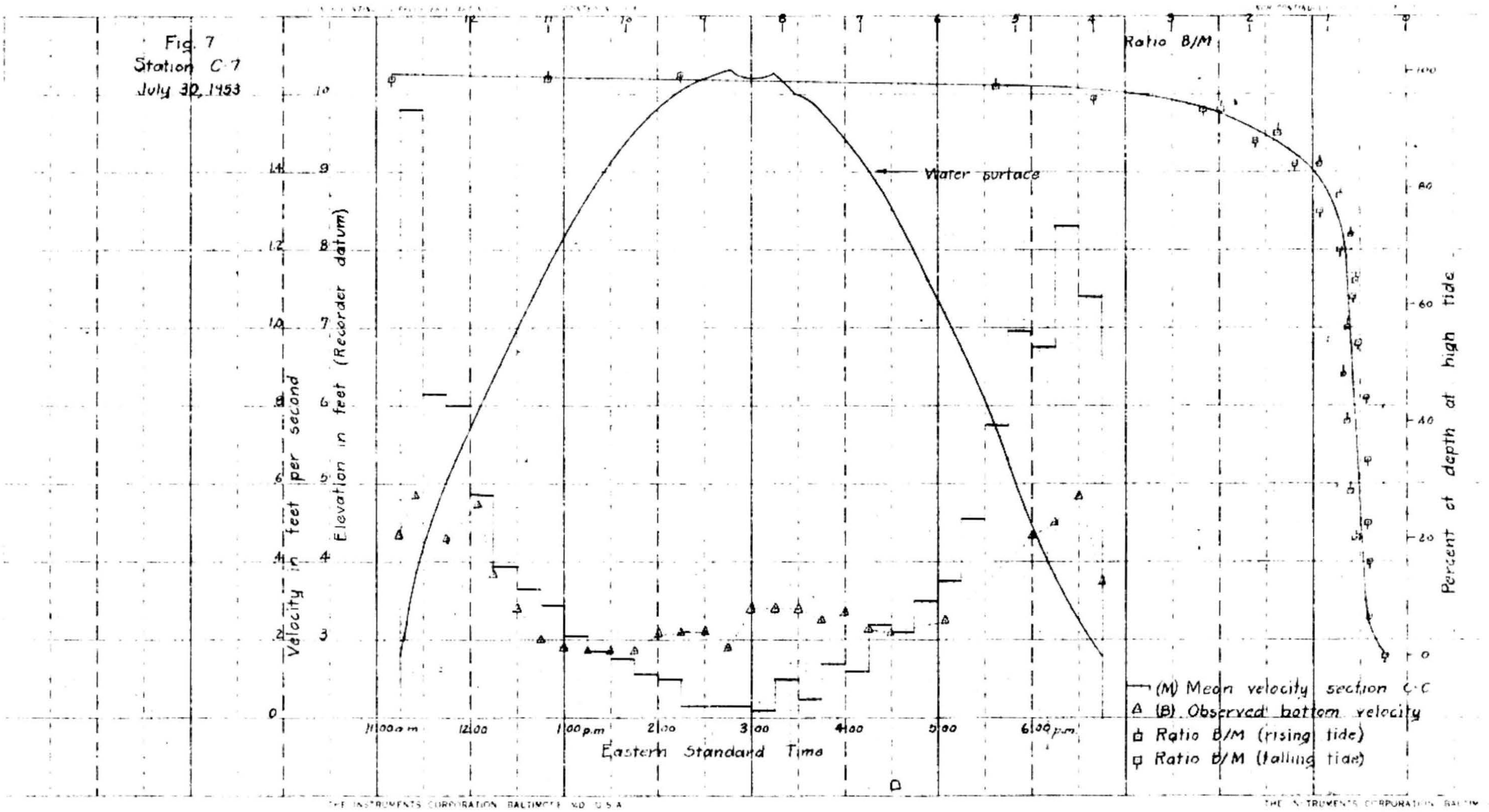


Fig. 7
Station C-7
July 30, 1953
Ratio B/M
Water surface
Velocity in feet per second
Elevation in feet (Recorder datum)
Percent of depth at high tide
Eastern Standard Time
11:00 a.m.
12:00
1:00 p.m.
2:00
3:00
4:00
5:00
6:00 p.m.
(M) Mean velocity section C-C
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

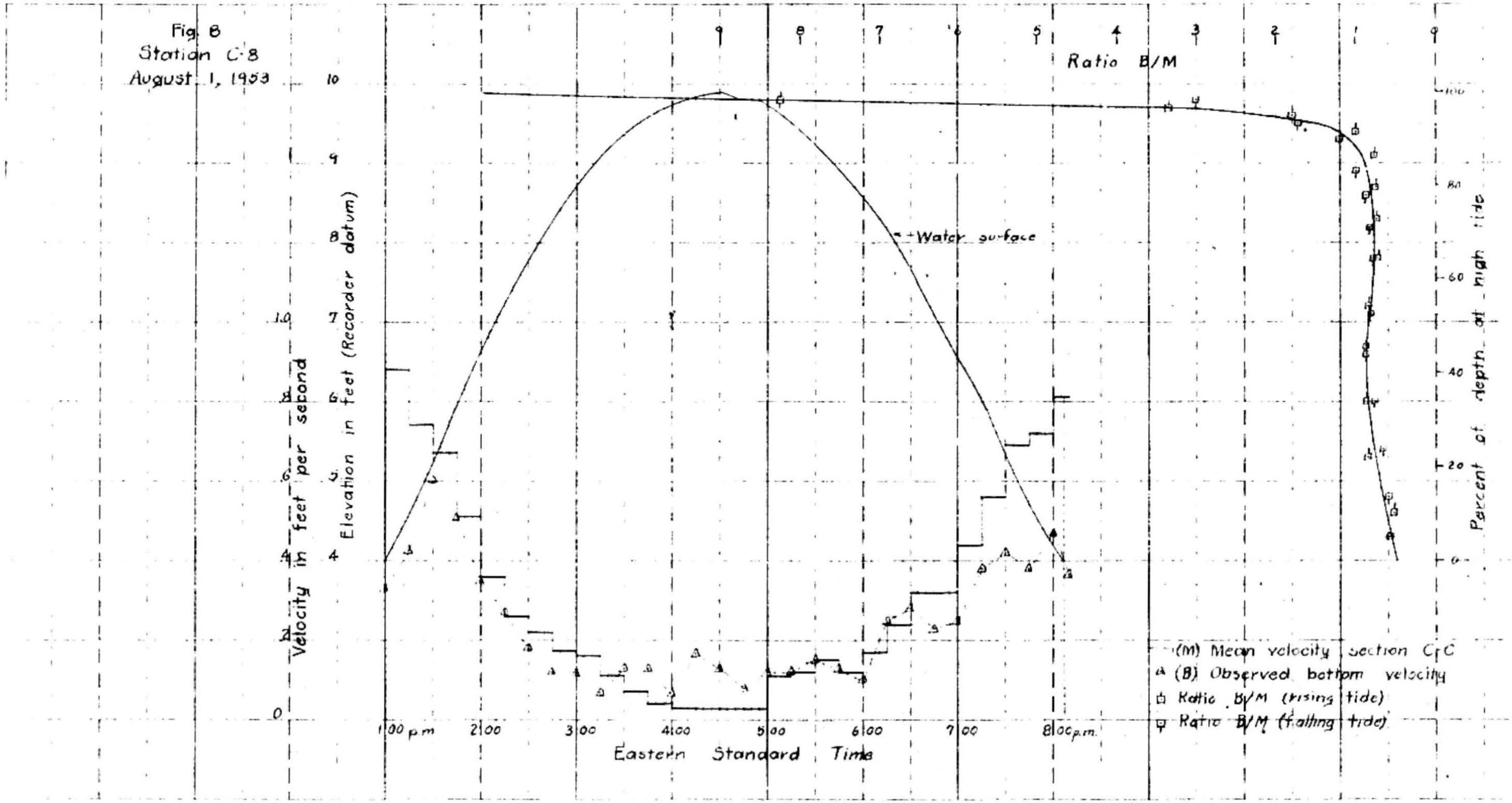


Fig. 8
Station C-8
August 1, 1953
Ratio B/M
Water surface
Velocity in feet per second
Elevation in feet (Recorder datum)
Percent of depth at high tide
Eastern Standard Time
1:00 p.m.
2:00
3:00
4:00
5:00
6:00
7:00
8:00 p.m.
(M) Mean velocity section C-C
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

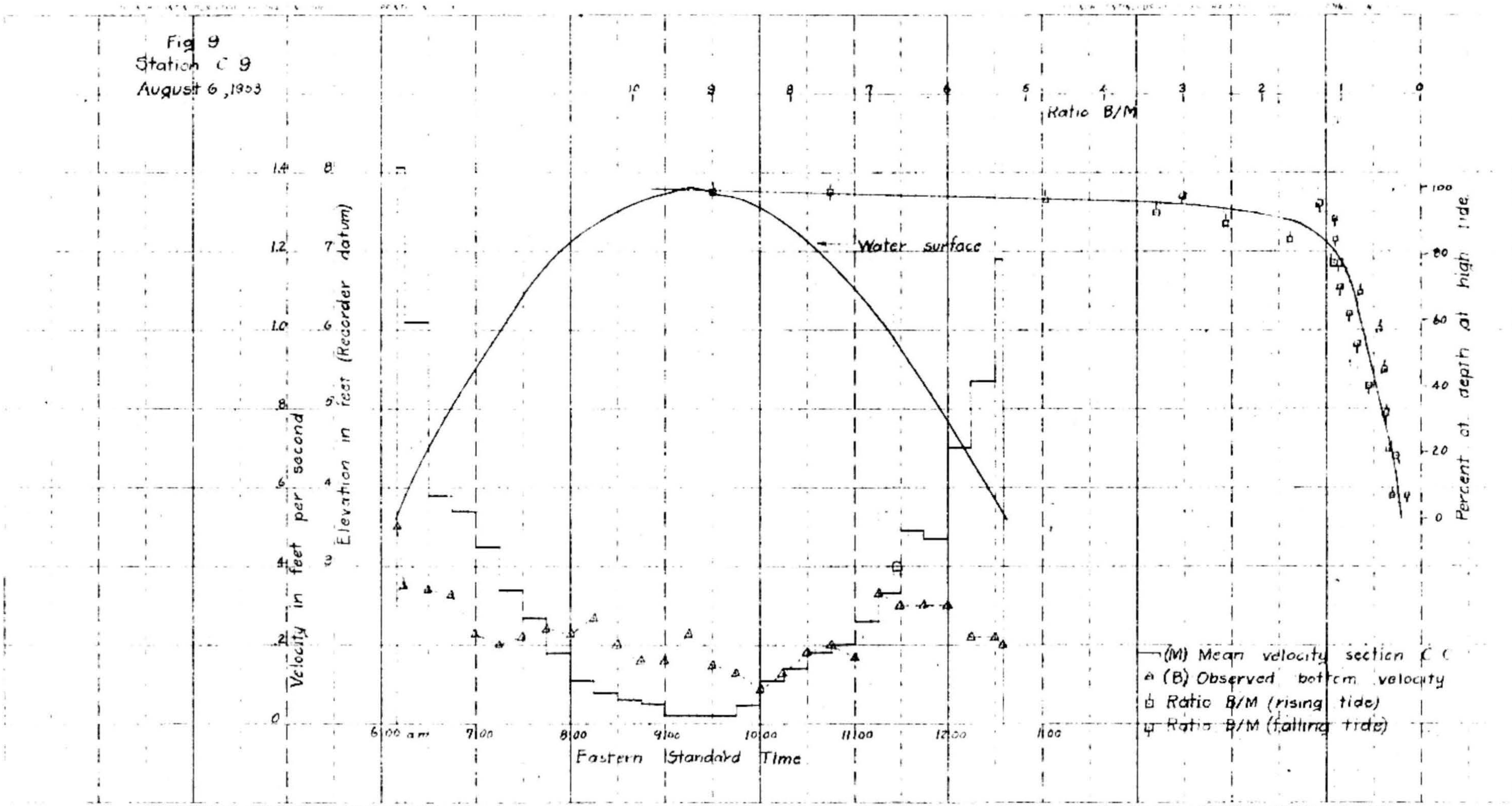


Fig 9
Station C 9
August 6, 1953
Ratio B/M
10 9 8 7 6 5 4 3 2 1 0
Water surface
Velocity in feet per second
Elevation in feet (Recorder datum)
Percent at depth at high tide
Eastern Standard Time
6:00 am 7:00 8:00 9:00 10:00 11:00 12:00 1:00
(M) Mean velocity section C C
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

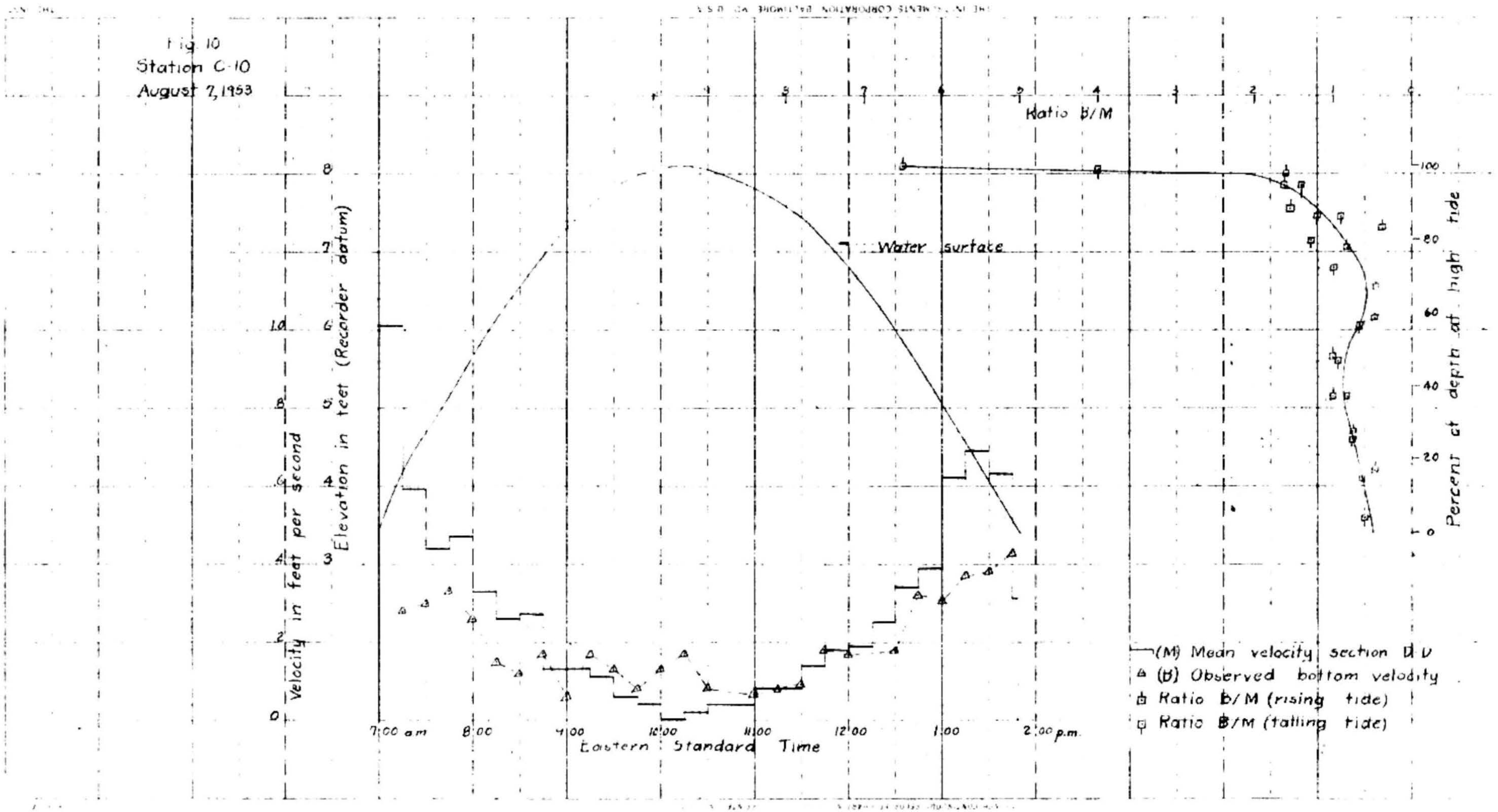


Fig. 10
Station C-10
August 7, 1953
Ratio B/M
Water surface
Velocity in feet per second
Elevation in feet (Recorder datum)
Percent of depth at high tide
Eastern Standard Time
7:00 am
8:00
9:00
10:00
11:00
12:00
1:00
2:00 p.m.
(M) Mean velocity section D V
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

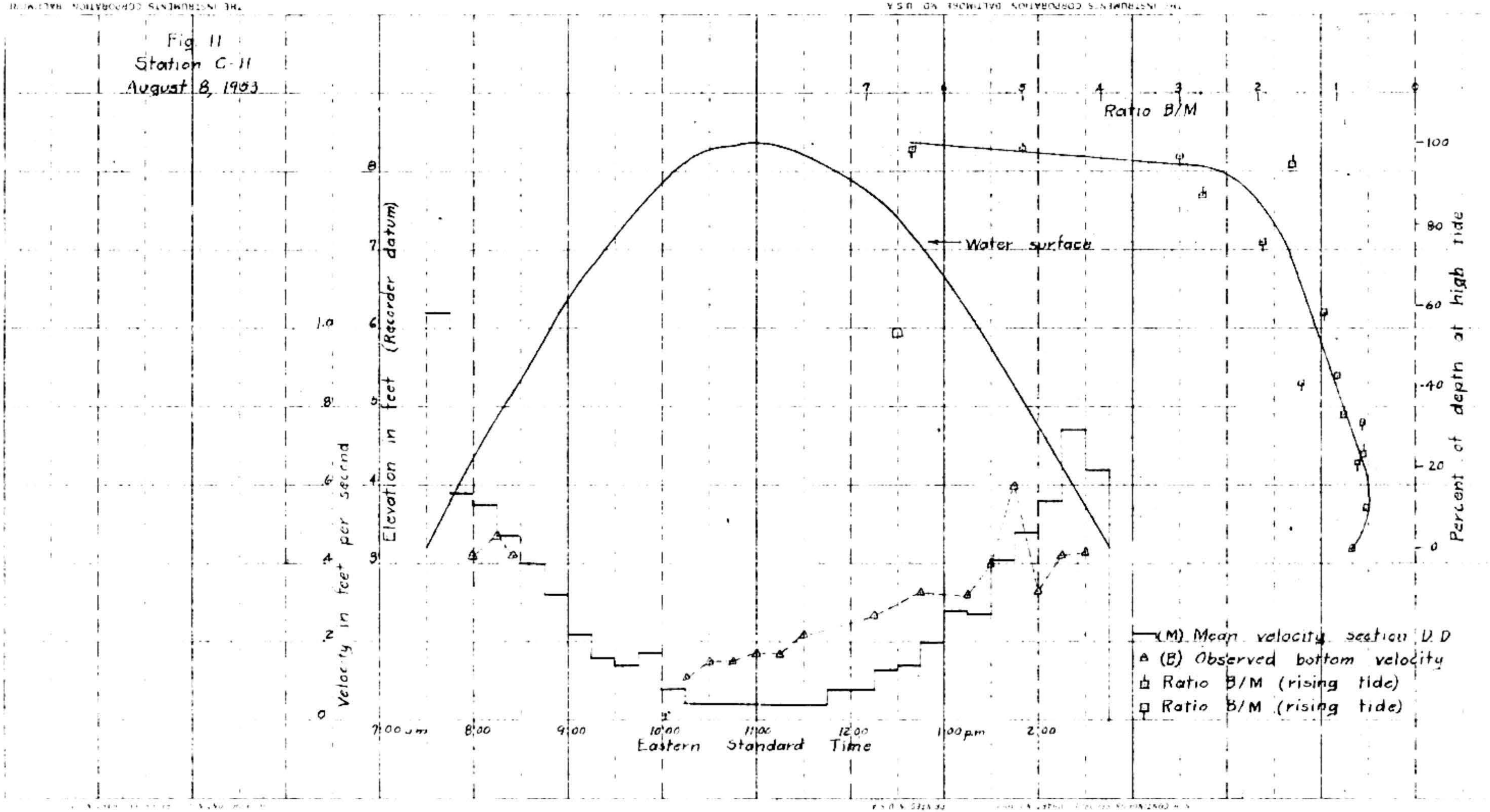


Fig. 11
Station C-11
August 8, 1953
Ratio B/M
Water surface
Elevation in feet (Recorder datum)
Velocity in feet per second
Percent of depth at high tide
Eastern Standard Time
7:00 am
8:00
9:00
10:00
11:00
12:00
1:00 pm
2:00
(M) Mean velocity section D D
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (rising tide)

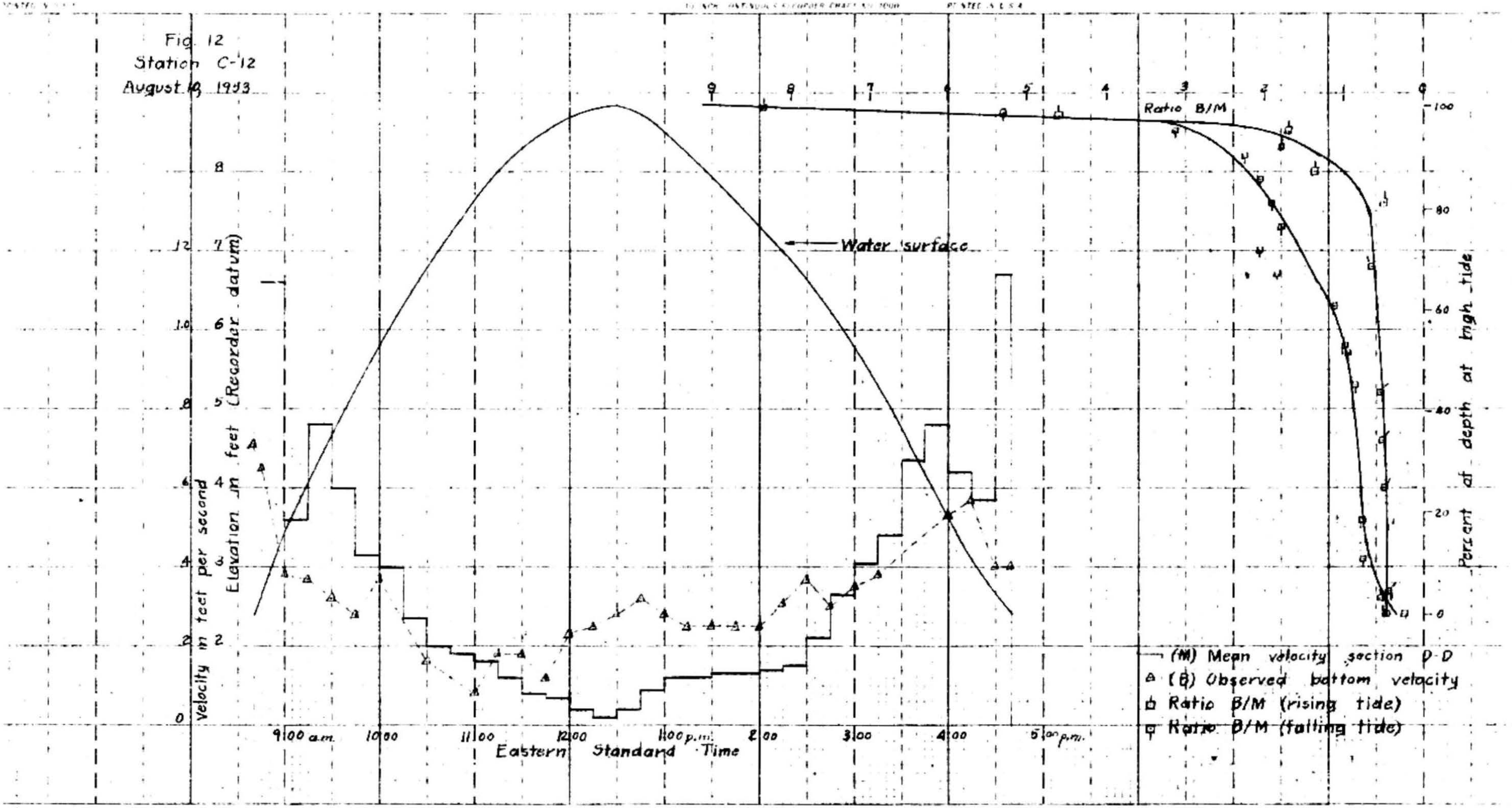


Fig. 12
Station C-12
August 10, 1953
Water surface
Ratio B/M
Velocity in feet per second
Elevation in feet (Recorder datum)
Percent of depth at high tide
9:00 a.m.
10:00
11:00
12:00
1:00 p.m.
2:00
3:00
4:00
5:00 p.m.
Eastern Standard Time
(M) Mean velocity section D-D
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

Fig. 13
Station C-13
August 11, 1953

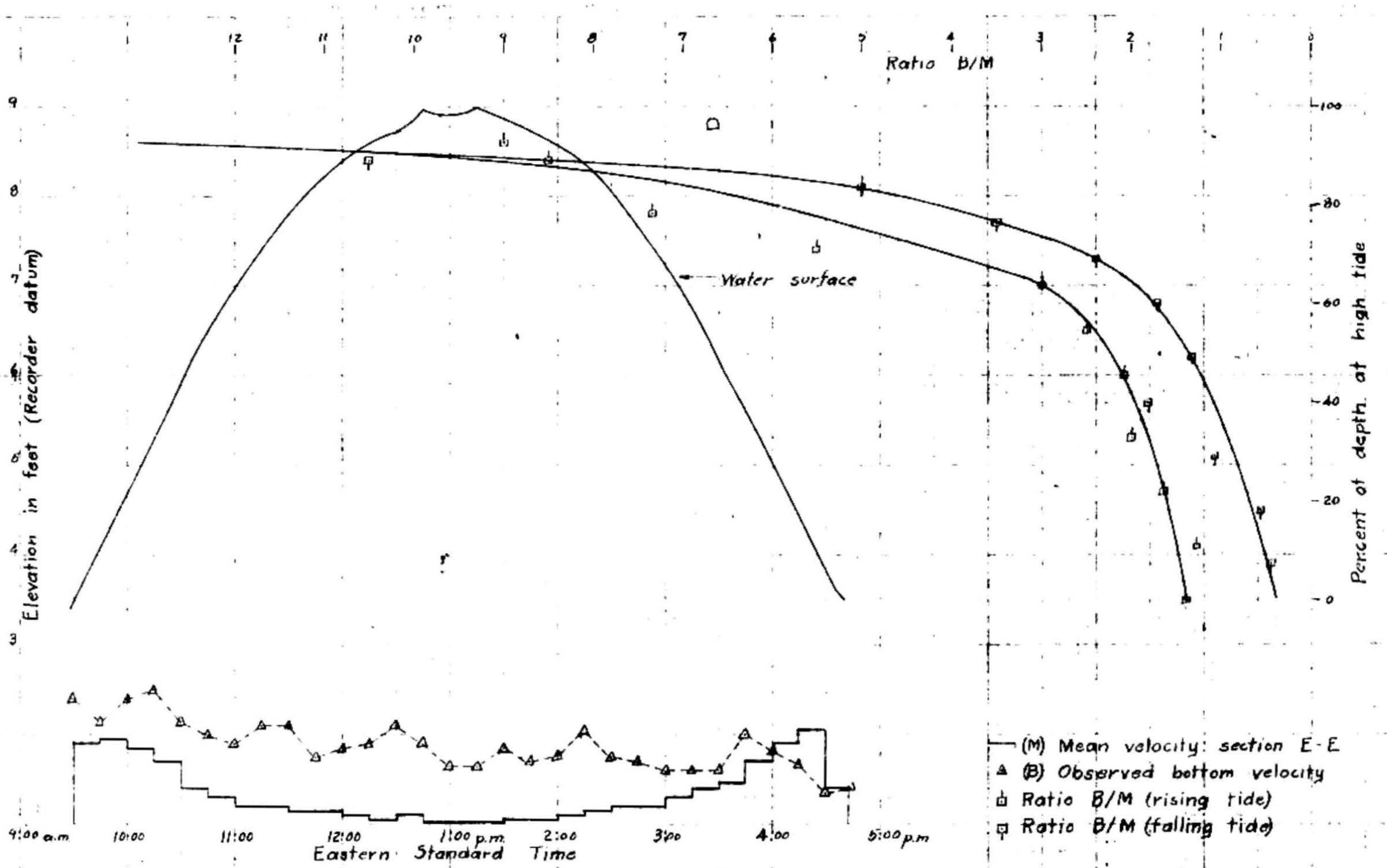
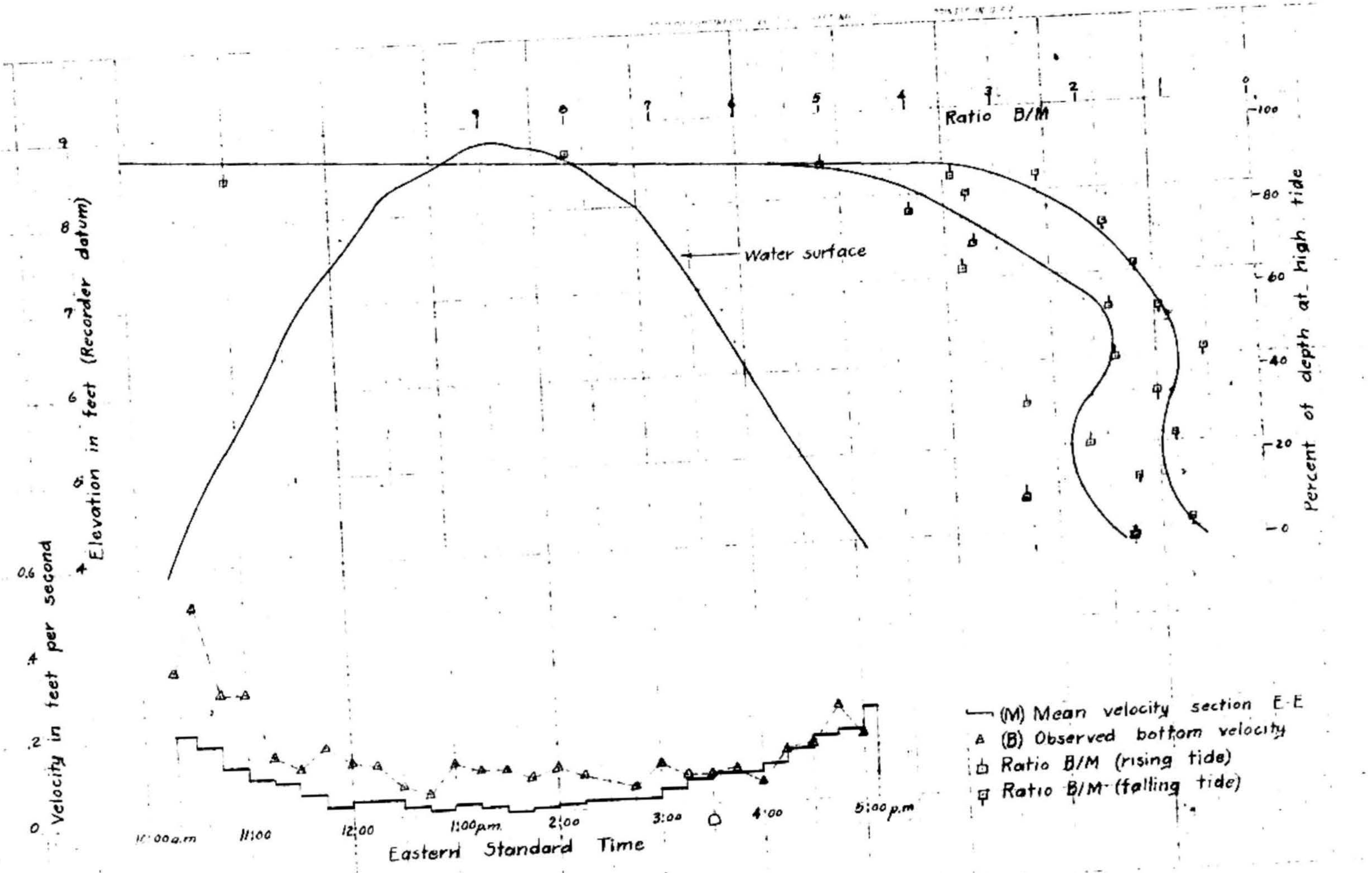


Fig. 14
Station C-14
August 12, 1953



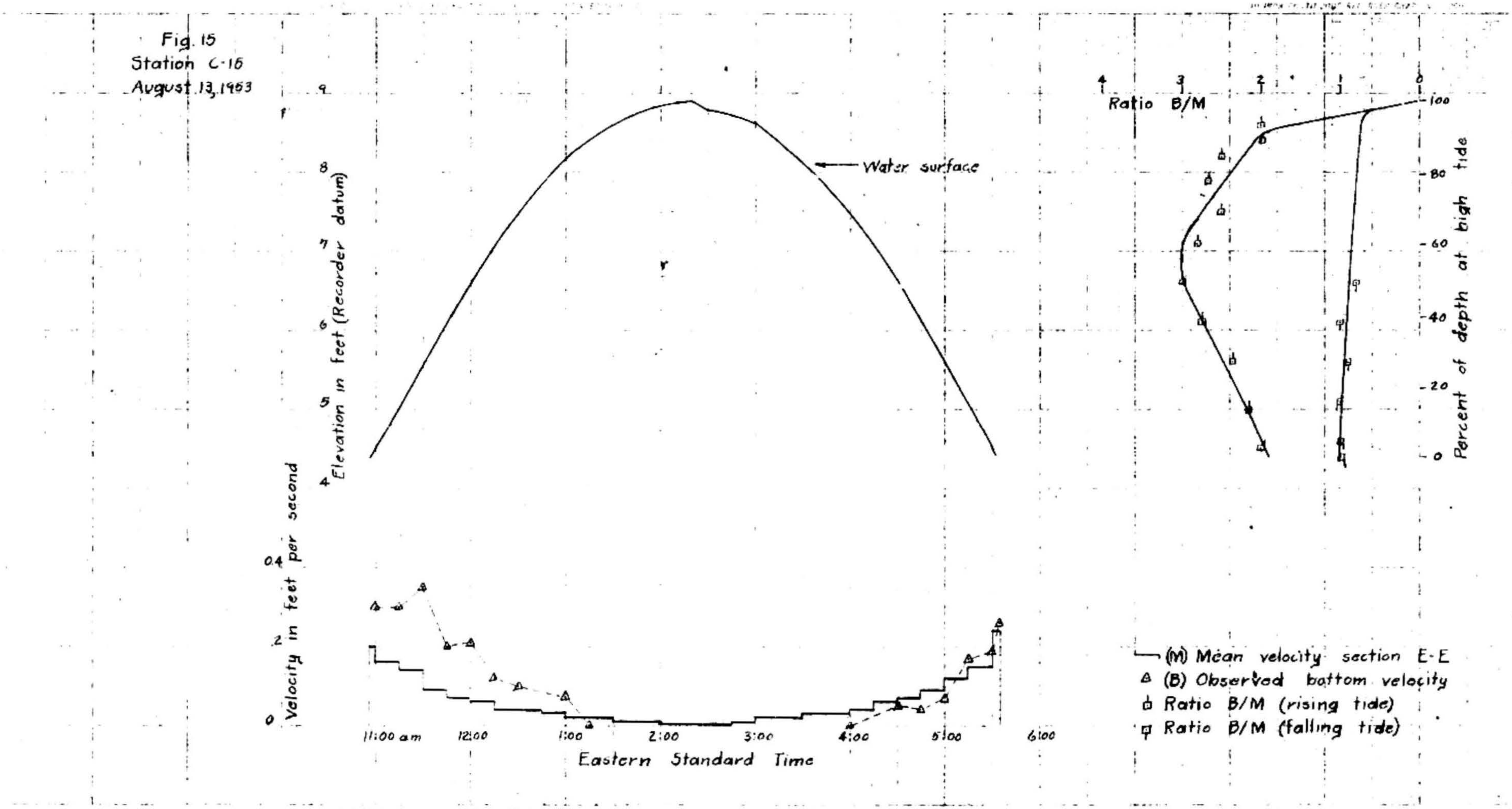


Fig. 15
Station C-16
August 13, 1953
Water surface
Elevation in feet (Recorder datum)
Ratio B/M
Percent of depth at high tide
Velocity in feet per second
11:00 am
12:00
1:00
2:00
3:00
4:00
5:00
6:00
Eastern Standard Time
(M) Mean velocity section E-E
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

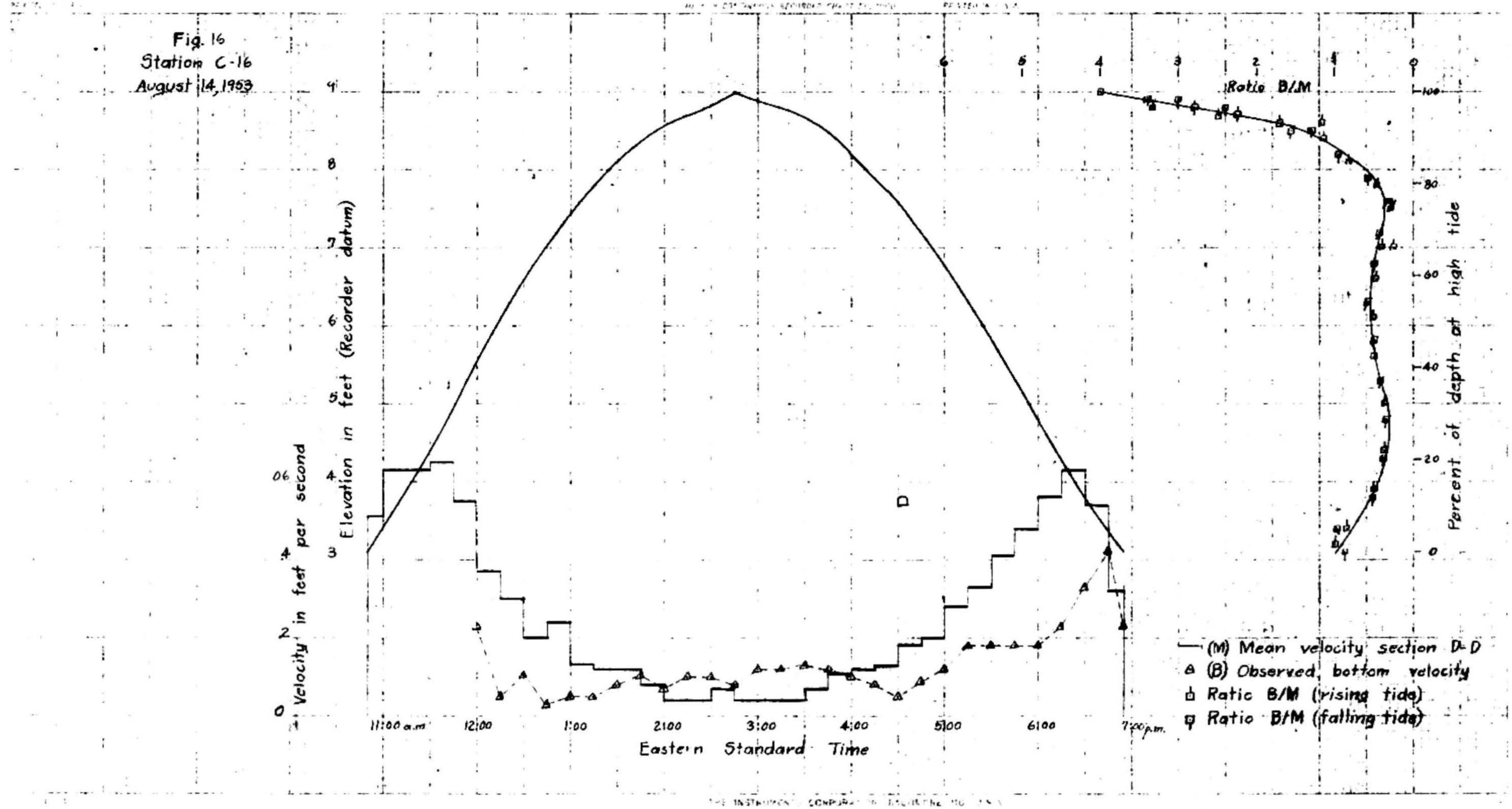


Fig. 16
Station C-16
August 14, 1953
Elevation in feet (Recorder datum)
Velocity in feet per second
Ratio B/M
Percent of depth at high tide
D
11:00 a.m.
12:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00 p.m.
Eastern Standard Time
(M) Mean velocity section D-D
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

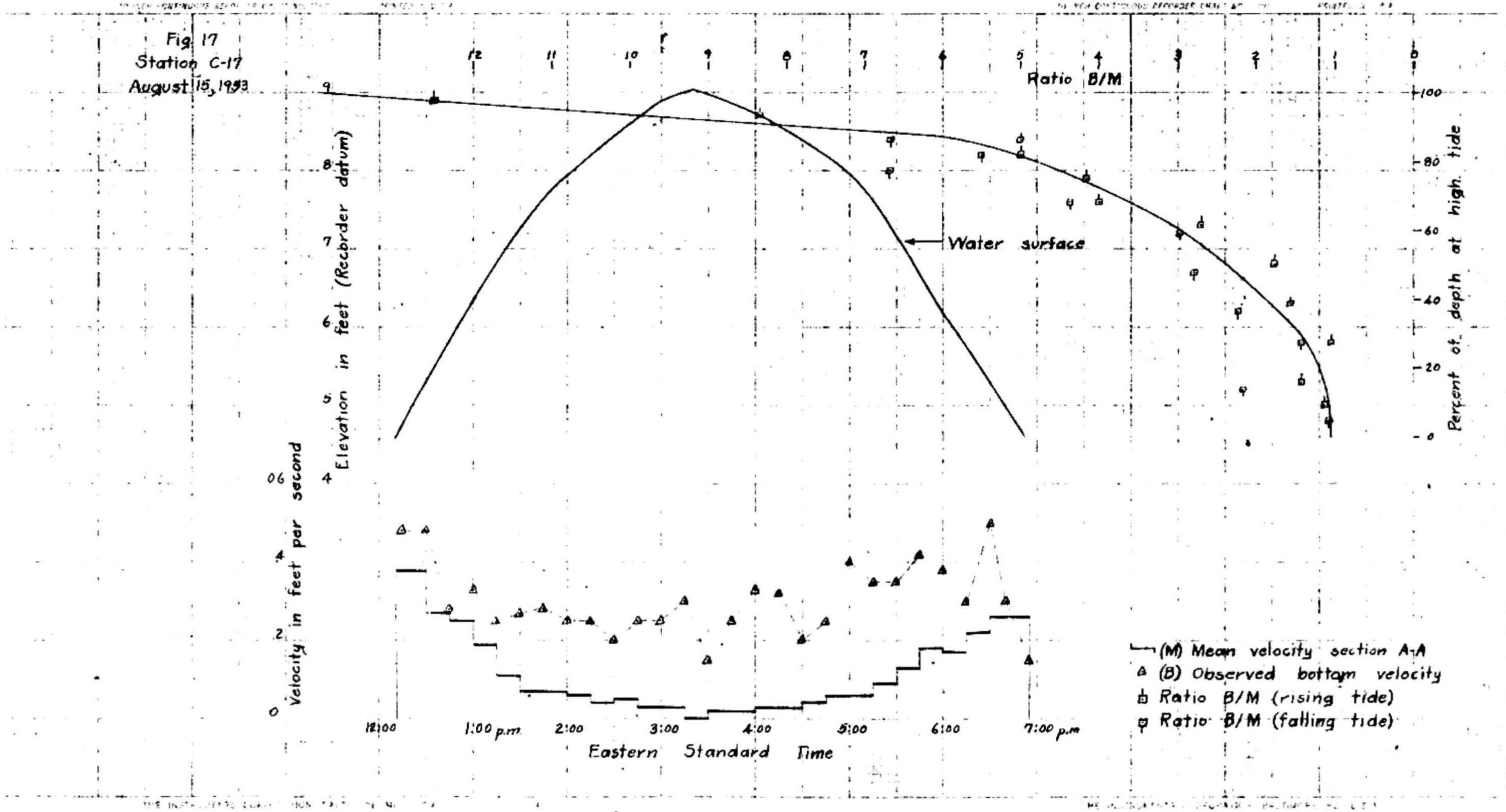
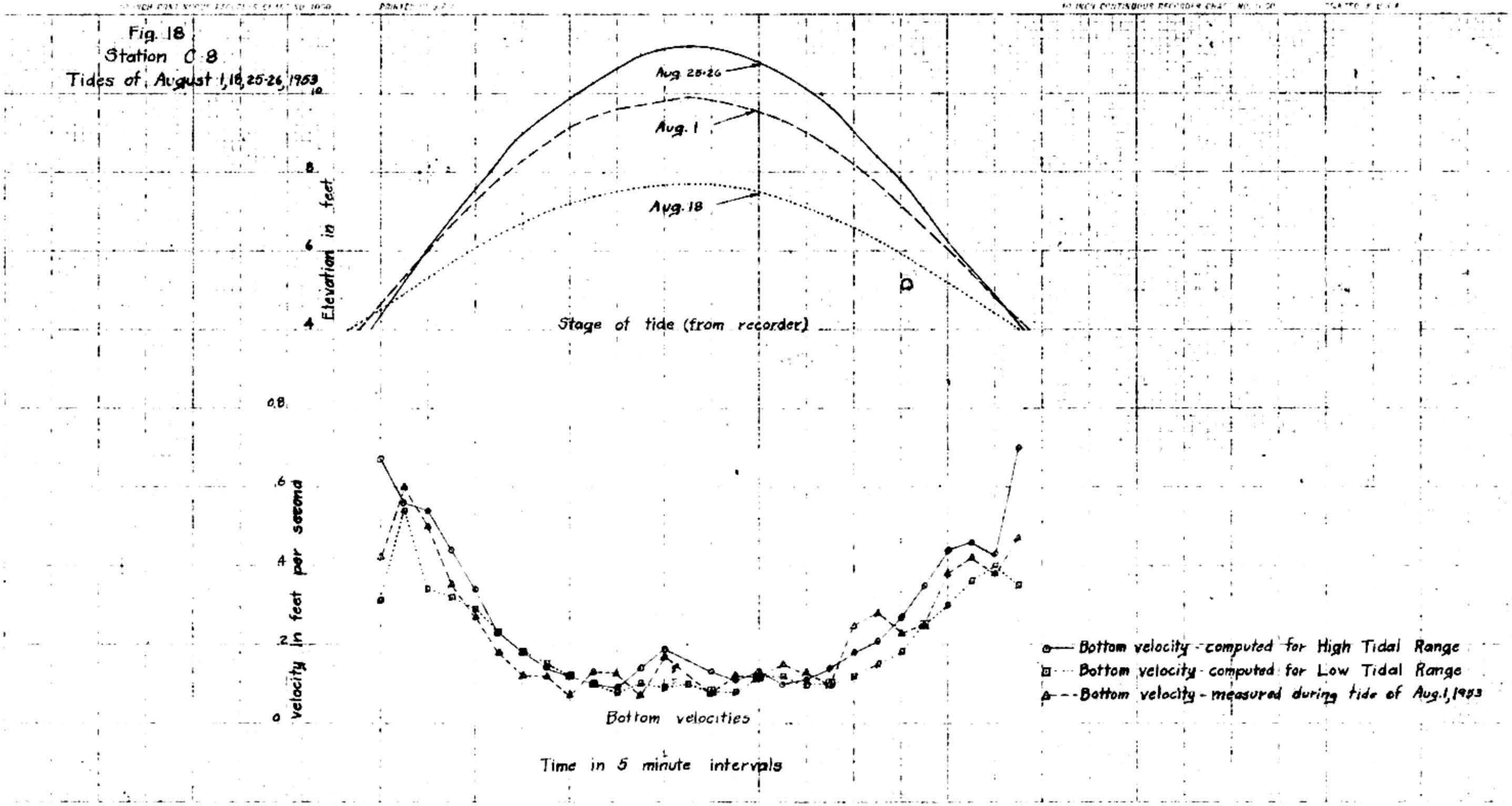


Fig. 17
Station C-17
August 15, 1953
Ratio B/M
12
11
10
9
8
7
6
5
4
3
2
1
0
Elevation in feet (Recorder datum)
9
8
7
6
5
4
Percent of depth at high tide
100
80
60
40
20
0
Water surface
Velocity in feet per second
06
4
2
0
12:00
1:00 p.m.
2:00
3:00
4:00
5:00
6:00
7:00 p.m.
Eastern Standard Time
(M) Mean velocity section A-A
(B) Observed bottom velocity
Ratio B/M (rising tide)
Ratio B/M (falling tide)

Fig. 18
Station C-8
Tides of August 1, 18, 25-26, 1953



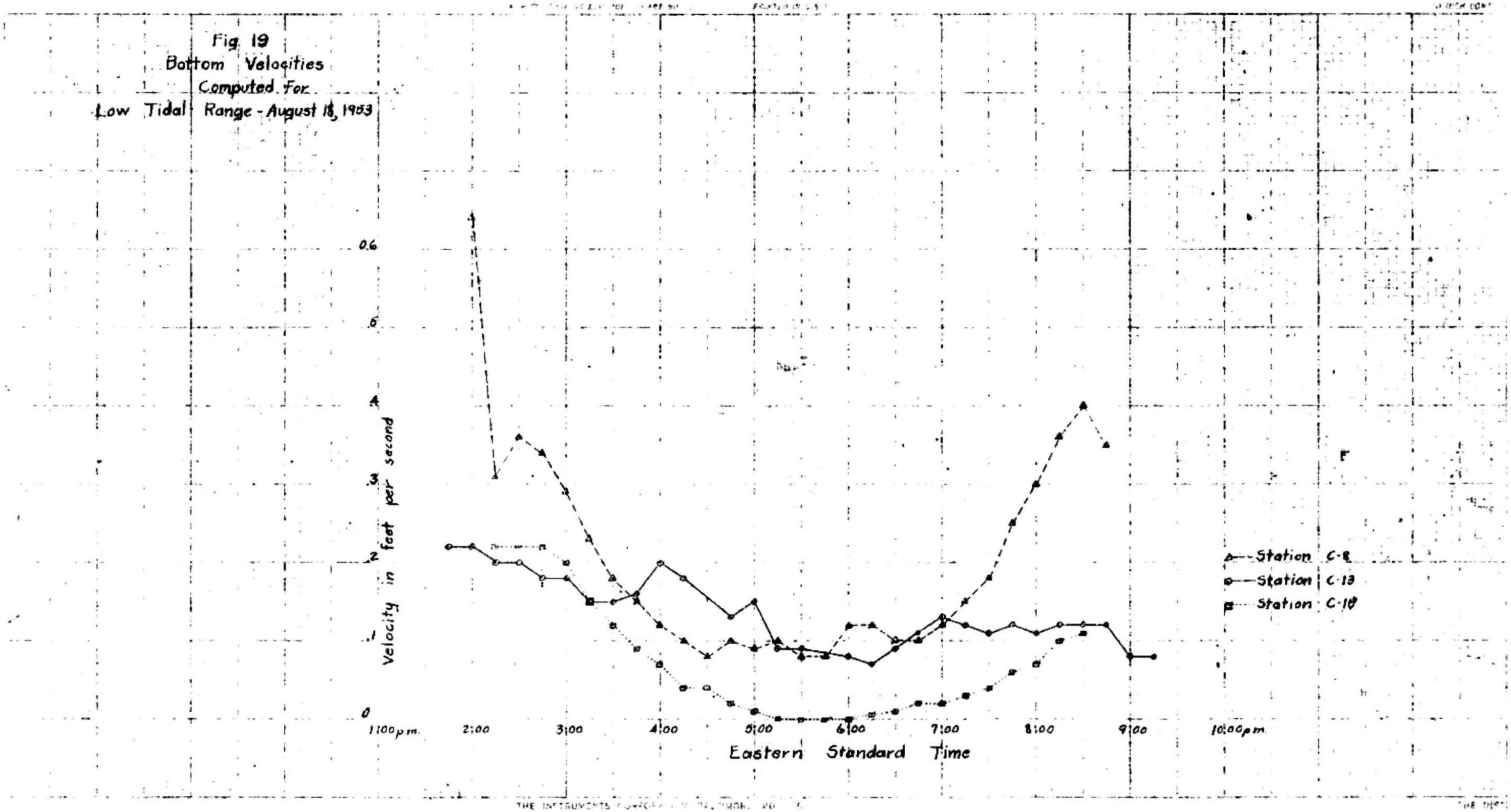


Fig. 19
Bottom Velocities
Computed For
Low Tidal Range - August 18, 1953
Velocity in feet per second
0
.1
.2
.3
.4
.5
0.6
1:00 p.m.
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00 p.m.
Eastern Standard Time
Station C-8
Station C-13
Station C-10