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TIDES, CURRENTS, MAGNETIC VARIATION,

AND

GEOGRAPHICAL POSITIONS OF LIGHT-HOUSES.

CHESAPEAKE BAY AND ITS RIVERS.

1861.

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1861

PREPARED BY PROFESSOR BACHE, ASSISTED BY CHARLES A. SCHOTT AND L. F. POURTALES,
ASSISTANTS UNITED STATES COAST SURVEY.

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Notes on the Coast of the United States

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TIDES IN CHESAPEAKE BAY AND ITS TRIBUTARIES.

NUMEROUS tidal stations were occupied for longer or shorter periods during the progress of the hydrographic survey of Chesapeake bay. The results have been collected in the following table, (Table I,) which gives the name of the station, the mean interval between the time of the moon's transit and the time of high water, the mean rise and fall of tides, and of spring and neap tides, and the mean duration of the rise and of the fall of the tide, reckoned from the middle of one stand to the middle of the next.

By means of this table, and of an Almanac, the time and height of high water may be obtained for any particular day.

When greater accuracy is desired, the corrections given in Table II are to be applied. This table applies more particularly to Old Point Comfort and Baltimore, but can also be used for places in the lower and upper half of the bay, respectively.

TABLE I.

Tide tables for Chesapeake bay and rivers.

Localities.	Mean interval between time of moon's transit and time of high water.	Rise and fall.			Mean duration of—	
		Mean.	Spring.	Neap.	Rise.	Fall.
East shore of bay.	*h. m.*	*Feet.*	*Feet.*	*Feet.*	*h. m.*	*h. m.*
Fisherman's inlet, Cape Charles	7 45	3.2	.....	.....	.....	.....
Hunger's creek	9 0	1.8	.....	.....	.....	.....
Sharp's island †	2 49	1.1	.....	.....	.....	.....
Cambridge, (Choptank river) †	3 18	1.7	.....	.....	.....	.....
Poplar island	3 54	1.2	.....	.....	.....	.....
Harrison's wharf, Chester river	6 22	1.7	.....	.....	.....	.....
Harris's wharf, below Swan Point	5 22	1.3	.....	.....	.....	.....
Sassafras river	9 0	1.7	.....	.....	.....	.....
Elk river, (mouth of Bohemia creek)†	8 1	2.2	.....	.....	.....	.....
Frenchtown	8 37	.....	.....	.....	.....	.....
Northeast river	8 49	2.1	.....	.....	.....	.....
Susquehanna river	9 24	2.4	.....	.....	.....	.....
West shore of bay.						
Cape Henry	7 25	2 4	.....	.....	.....	.....
Old Point Comfort *	8 17	2.5	3.0	2.0	6 1	6 25
Norfolk†	8 49	2.8	3.3	2.3	5 43	6 43
Newport News †	9 9	2.5	3.4	1.7	6 3	6 18
York river entrance	8 39	2.4	.....	.....	.....	.....
Piankatank river entrance †	10 5	1.3	1.9	0.7	5 51	6 36
Point Lookout *	0 32	1.4	1.9	0.7	5 59	6 19
Patuxent river entrance, (Drum Point) †	1 16	1.4	1.9	0.7	5 48	6 45
Fairhaven, Herring bay †	3 24	1.1	.....	.....	.....	.....
Annapolis *	4 38	0.9	1.0	0.8	6 11	6 15
Bodkin Point *	5 42	1.0	1.3	0.8	5 23	7 8
Baltimore *	6 33	1.3	1.5	0.9	5 54	6 33
Gunpowder river †	7 1	1.2	.....	.....	.....	.....
Pool's island †	7 13	1.3	.....	.....	.....	.....
Bush river	7 50	1.3	.....	.....	.....	.....
Havre de Grace	8 47	2.4	.....	.....	.....	.....

TABLE I.—*Tide tables for Chesapeake bay and rivers*—Continued.

Localities.	Mean interval between time of moon's transit and time of high water.	Rise and fall.			Mean duration of—	
		Mean.	Spring.	Neap.	Rise.	Fall.
Rivers.	*h. m.*	*Feet.*	*Feet.*	*Feet.*	*h. m.*	*h. m.*
City Point, James river †	2 11	2.8	3.0	2.5	5 14	6 58
Curl's Neck, James river †	3 31	3.2	3.4	2.8	5 32	6 54
Richmond, James river †	4 28	2.9	3.4	2.3	4 53	7 31
Petersburg, Appomattox river †	4 45	2.6	.....	.....	4 57	7 35
Moody's wharf, York river	9 35	3.0	.....	.....	.....	.....
Tappahannock, Rappahannock river *	0 42	1.6	1.8	1.3	5 21	7 6
Saunders' wharf, Rappahannock river †	3 2	1.5	.....	.....	5 47	7 12
Washington Navy Yard *	7 44	3.0	3.4	2.5	5 37	6 49
Hunting creek, Patuxent river	2 38	1.6	.....	.....	.....	.....

NOTE.—The stations marked with a * are the most reliable, being derived from several months observations; in most cases even more than a year's. Those marked with a † are good; the other ones rough approximations, being based on few observations. The rise and fall of spring tides is greater and of neap tides smaller than the mean by about half a foot. The duration of rise and of fall of the tide may be deduced from such places where it is not given, from the nearest complete station, recollecting, however, that the further up a river the shorter the duration of rise and the longer the duration of fall.

The following table gives the corrections to be applied to the mean interval between the time of the moon's transit and the time of high water, and also to the mean rise and fall at Old Point Comfort and Baltimore for every half hour of the moon's transit:

TABLE II.

Time of moon's transit or southing.	Old Point Comfort.				Baltimore.			
	Correction to mean interval.		Correction to mean rise and fall.		Correction to mean interval.		Correction to mean rise and fall.	
h. m.		*m.*		*ft.*		*m.*		*ft.*
0 0	Add	16	Add	0.4	Add	14	Add	0.2
0 30		10				9		
1 0		4		0.5		4		0.2
1 30	Subtract	2			Subtract	2		
2 0		8		0.4		7		0.2
2 30		13				12		
3 0		17		0.1		16		0.1
3 30		21				20		
4 0		25	Subtract	0.2		22		0.0
4 30		28				23		
5 0		29		0 4		23	Subtract	0.2
5 30		27				20		
6 0		24		0.5		14		0.4
6 30		17				8		
7 0		10		0.5		1		0.4
7 30		2			Add	6		
8 0	Add	7		0.3		11		0.3
8 30		16				16		
9 0		23		0.0		19		0.2
9 30		28				21		
10 0		31	Add	0.3		21		0.0
10 30		31				21		
11 0		29		0.5		17	Add	0.1
11 30		23				15		

By means of these numbers, Tables III, IV, and V have been computed, giving the times of high water at Old Point Comfort, Annapolis, and Baltimore, for the months of June, July, and

August, 1861. The average probable error of the times given in them is about 20 minutes; but the error may amount to more than an hour when the tide is disturbed by the wind. This is more likely to be the case near the head of the bay and rivers than near the mouth. At Washington northerly and westerly winds depress, and southerly and easterly elevate, the level of the water in the river. As a general rule, northerly winds will depress or southerly winds elevate the mean level of the water in the upper part of the bay. In the rivers and lateral bays this effect will be slightly modified by their direction.

TABLE III.

Approximate mean time of high water at Old Point Comfort, Virginia, for June, July, and August, 1861.

Day of month.	June.		July.		August.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
	h. m.	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*
1	2 25	2 50	2 24	2 50	3 35	4 7
2	3 15	3 40	3 16	3 45	4 41	5 16
3	4 7	4 35	4 15	4 45	5 48	6 18
4	5 2	5 25	5 16	5 46	6 48	7 15
5	5 55	6 21	6 16	6 45	7 41	8 2
6	6 47	7 11	7 12	7 37	8 22	8 42
7	7 35	7 57	8 1	8 21	9 12	9 22
8	8 17	8 37	8 41	9 3	9 42	10 1
9	8 59	9 20	9 24	9 44	10 22	10 43
10	9 41	10 2	10 4	10 25	11 5	11 28
11	10 24	10 45	10 45	11 7	11 52	.....
12	11 6	11 29	11 28	11 48	0 14	0 40
13	11 50	.....	.....	0 10	1 9	1 41
14	0 11	0 34	0 33	0 58	2 15	2 52
15	0 58	1 24	1 25	1 55	3 30	4 9
16	1 51	2 20	2 28	3 2	4 46	5 23
17	2 51	3 23	3 39	4 16	5 57	6 28
18	3 57	4 33	4 55	5 33	6 56	7 22
19	5 9	5 44	6 9	6 43	7 44	8 4
20	6 20	6 53	7 13	7 40	8 22	8 39
21	7 23	7 52	8 4	8 26	8 57	9 13
22	8 16	8 40	8 46	9 5	9 30	9 47
23	9 4	9 26	9 25	9 44	10 4	10 21
24	9 49	10 11	10 2	10 20	10 39	10 57
25	10 31	10 52	10 38	10 56	11 17	11 35
26	11 13	11 32	11 15	11 33	11 54	.....
27	11 51	.....	11 51	.....	0 15	0 38
28	0 10	0 29	0 10	0 29	1 3	1 29
29	0 50	1 11	0 50	1 13	1 57	2 29
30	1 34	2 8	1 38	2 4	3 1	3 34
31	.....	.....	2 34	3 3	4 9	4 42

NOTE.—It is low water 6*h.* 25*m.* after the time of high water.

TABLE IV.

Approximate mean time of high water at Baltimore, Md., for June, July, and August, 1861.

Day of month.	June.		July.		August.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
	h. m.	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*
1	0 50	1 15	0 49	1 15	1 59	2 29
2	1 39	2 4	1 40	2 9	2 59	3 30
3	2 29	2 53	2 36	3 2	4 0	4 27
4	3 18	3 41	3 30	3 57	4 52	5 19
5	4 5	4 29	4 25	4 50	5 44	6 9
6	4 52	5 15	5 16	5 41	6 33	6 57
7	5 38	6 2	6 6	6 32	7 18	7 39
8	6 26	6 51	6 56	7 19	7 59	8 18
9	7 14	7 36	7 40	8 0	8 39	9 1
10	7 57	8 19	8 21	8 42	9 22	9 45
11	8 41	9 2	9 2	9 24	10 9	10 35
12	9 25	9 46	9 45	10 7	11 2	11 32
13	10 9	10 32	10 30	10 55	.....	0 5
14	10 56	11 21	11 21	11 49	0 41	1 18
15	11 48	.....	.....	0 20	1 54	2 30
16	0 17	0 45	0 53	1 27	3 4	3 37
17	1 17	1 48	2 3	2 37	4 7	4 36
18	2 20	2 52	3 12	3 46	5 1	5 25
19	3 25	3 56	4 19	4 48	5 48	6 11
20	4 28	4 58	5 17	5 44	6 32	6 54
21	5 27	5 56	6 10	6 37	7 13	7 30
22	6 25	6 55	7 1	7 10	7 47	8 4
23	7 19	7 42	7 42	8 0	8 21	8 38
24	8 5	8 27	8 19	8 37	8 56	9 14
25	8 47	9 9	8 55	9 13	9 33	9 53
26	9 30	9 49	9 32	9 50	10 14	10 36
27	10 10	10 30	10 10	10 30	11 0	11 25
28	10 51	11 12	10 51	11 12	11 53	.....
29	11 34	11 58	11 36	.....	0 25	0 54
30	.....	0 24	0 2	0 30	1 26	1 57
31	.....	.....	0 59	1 29	2 30	3 0

NOTE.—It is low water 6*h.* 33*m.* after the time of high water.

TABLE V.

Approximate mean time of high water at Annapolis, Md., June, July, and August, 1861.

Day of month.	June.		July.		August.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
	h. m.	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*
1	11 20	11 44	11 20	11 45	0 4	0 34
2	.....	12 09	.....	12 14	1 4	1 35
3	0 34	12 59	0 41	1 08	2 5	2 32
4	1 23	1 46	1 35	2 02	2 58	3 24
5	2 10	2 34	2 30	2 55	3 50	4 13
6	2 57	3 20	3 21	3 47	4 38	5 2
7	3 44	4 07	4 12	4 37	5 23	5 45
8	4 32	4 56	5 01	5 24	6 4	6 23
9	5 19	5 42	5 46	6 05	6 44	7 6
10	6 02	6 24	6 26	6 47	7 27	7 50
11	6 45	7 07	7 07	7 29	8 14	8 40
12	7 30	7 51	7 50	8 12	9 7	9 37
13	8 14	8 37	8 35	9 00	10 11	10 46
14	9 01	9 26	9 26	9 54	11 22	11 59
15	9 53	10 22	10 25	10 58	.....	0 36
16	10 51	11 21	11 32	.....	1 9	1 42
17	11 53	.....	0 07	12 42	2 12	2 41

TABLE V—Continued.

Day of month.	June.		July.		August.	
	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
	h. m.	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*
18	0 25	12 57	1 17	1 21	3 6	3 31
19	1 30	2 01	2 24	2 53	3 53	4 15
20	2 33	3 03	3 22	3 49	4 37	4 59
21	3 33	4 01	4 15	4 42	5 17	5 35
22	4 31	5 00	5 06	5 26	5 52	6 9
23	5 26	5 49	5 48	6 05	6 26	6 44
24	6 10	6 33	6 24	6 43	7 1	7 19
25	6 54	7 14	7 00	7 18	7 38	7 58
26	7 35	7 55	7 37	7 55	8 19	8 41
27	8 15	8 35	8 15	8 35	9 5	9 30
28	8 56	9 17	8 56	9 17	9 58	10 28
29	9 39	10 04	9 41	10 07	10 58	11 31
30	10 29	10 54	10 34	11 04	.....	0 3
31	.....	.....	11 33	.....	0 36	1 5

NOTE.—It is low water at Annapolis 6*h.* 15*m.* after the time of high water. It is high water at Havre de Grace about 4*h.* 9*m.* after the time of high water at Annapolis.

Co-tidal lines of Chesapeake bay.

The co-tidal lines are drawn on the chart from the observed mean tidal establishments of the coast, bay, and rivers. They show the mean interval between high water (middle of stand) and the moon's transit immediately preceding, and thus serve, in connection with the table of the half-monthly inequality of this interval, (Table II,) to determine the time of high water anywhere within the limits of the curves. The curves are drawn for intervals of half hours, and it will be seen that the tide-wave takes over twelve hours to go up the bay. If it is high water at the entrance and near the head of the bay, there will be at the same time a low water somewhere above the middle of the bay, and *vice versa.* These co-tidal lines also serve for the purpose of predicting the establishment of the current, (the horizontal component of the tidal wave,) according to the rules given under the head "Current."

The numbers in brackets, below the co-tidal hours, indicate the mean rise and fall in feet and decimals. For other periods of the half-monthly inequality Table II gives the necessary small correction for any particular case. The average uncertainty in the position of the curves may be estimated at about half an hour, and at about three-quarters of an hour in localities where observations are scanty. In the rivers much depends upon interpolation.

The tidal, as well as the current establishments here presented, should be considered as approximate, the observations being as yet incomplete.

Currents in Chesapeake bay.

Time.—At the entrance of the bay the ebb current begins three hours after the high water stand, (or nearly midway between high and low water;) between the mouths of the Rappahannock and York rivers this interval is about 1h. 45m.: in the vicinity of Annapolis it is but one hour, and at the head of the bay there is only half an hour between the high water stand and the commencement of the ebb current. The epoch of the beginning of the ebb, or outgoing stream, can be predicted, as well as the tides, (vertical motion,) by means of the ordinary tidal high water computation with the data furnished by the chart and the above stated differences,

according to the position in the bay. To find the beginning of the flood, add to the time so found the duration of the ebb and the duration of slack water between ebb and flood current, as given below. The average uncertainty in the current epoch may be estimated as one hour, the principal disturbing agency being the wind.

Direction.—The true direction of the ebb and flood current is indicated on the chart, the former by a half arrow ↓ the latter by a full arrow ↑. This direction refers to the time when the current runs with its greatest velocity.

Velocity.—The maximum velocity expressed in miles (nautical) per hour is written against the arrow, for ebb and flood respectively. The average greatest velocity of the ebb stream is 0.92m. and of the flood stream 0.86m., showing the slight effect due to the discharge of river water. At the entrance the maximum velocity of the ebb and flood is on the average 1.1m. Further up the bay it diminishes to 0.9m. and at the head of the bay it again increases to 1.0m.

Duration of slack water and of ebb and flood current.—The duration of slack water, preceding the ebb and flood, is sensibly equal, and does not appear to vary much from 20 minutes between the entrance and the head of the bay. At the entrance, and in Hampton Roads, the duration of the ebb and flood stream is nearly the same, namely, 5h. 50m.; but as we go up the bay the duration of ebb increases, while the flood diminishes. North of the mouth of the Potomac, these intervals are nearly as 6h. 26m. and 5h. 20m.; and near the head of the bay the duration of ebb may reach 7h. and the duration of the flood current be as short as 4h. 45m.

Magnetic Variation.—Chesapeake bay.

The curves (nearly straight lines) with the magnetic variation marked on the chart in half degrees represent the combined results of the separate determinations, given in the accompanying table. The epoch to which the observations have been referred is July, 1861, and by adding $2\frac{1}{2}$ minutes for each year following, the variation may be ascertained at any station for any year within the limits of the curves, during the next ten years.

The curves referred to are first approximations, and will be subject to future correction as our data become more complete. The greatest uncertainty may be taken as a quarter of a degree; but for the two lower curves ($1\frac{1}{2}°$ and 2° W.) it may amount to half a degree.

Table of observed variations of the magnetic needle between Delaware bay and the entrance to Chesapeake bay, inclusive of the Chesapeake bay and rivers, with results brought up to the middle of the year 1861.

Station.	Latitude N.	Longitude W.	Date.	Observed declination W.	Reduction to 1861.5.	Decl'n W. 1861.5.
	° ′	° ′		° ′	′	° ′
Wilmington	39 45	75 34	1846.4	2 31	+37	3 08
Sawyer	43	75 34	1846.5	2 48	37	3 25
Fort Delaware	35	75 34	1846.5	3 17	37	3 54
Susquehanna Light	32	76 05	1847.5	2 14	35	2 49
Osborn's Ruin	28	76 17	1845.5	2 32	40	3 12
Hawkins	26	75 17	1846.5	2 59	37	3 36
Pine Mount	25	75 20	1846.5	3 14	37	3 51
Finlay	24	76 31	1845.5	2 15	40	2 55
Bombay Hook	22	75 30	1846.5	3 18	37	3 55
Rosanne	17	76 43	1845.4	2 11	40	2 51
Pool's Island	17	76 15	1847.5	2 29	35	3 04
Fort McHenry	16	76 35	1856.7	2 29	12	2 41
Port Norris	15	75 01	1846.5	3 04	37	3 41
North Point	12	76 26	1846.5	1 37	37	2 14
Egg Island	10	75 08	1846.5	3 03	37	3 40

Table of observed variations of the magnetic needle between Delaware bay and the entrance to Chesapeake bay—Continued.

Station.	Latitude N.	Longitude W.	Date.	Observed declination W.	Reduction to 1861.5.	Decl'n W. 1861.5.
	° ′	° ′		° ′	′	° ′
Bodkin	39 08	76 25	1847.4	2 02	35	2 37
Soper	05	76 57	1850.6	2 07	27	2 34
Webb	05	76 40	1850.9	2 08	26	2 34
Kent Island (1)	02	76 19	1849.5	2 30	30	3 00
Taylor	00	76 28	1847.4	2 18	35	2 53
Town Bank	38 59	74 57	1846.5	2 59	37	3 36
Cape May Light	56	74 57	1855.6	3 45	15	4 00
Causten	55	77 04	1855.8	1 06	15	1 21
Hill	54	76 52	1850.7	2 19	27	2 46
South Base, Kent Island	54	76 22	1845.4	2 24	40	3 04
Washington, C. S. O.	53	77 00	1860.8	2 27	2	2 29
Marriott	52	76 36	1849.5	2 05	30	2 35
Lewes Landing	49	75 12	1846.5	2 45	37	3 22
Pilot Town	47	75 09	1846.5	2 43	37	3 20
Cape Henlopen	46	75 05	1856.6	3 04	12	3 16
Oxford	41	76 10	1856.7	2 41	12	2 53
Dagsborough	35	75 15	1856.6	2 41	12	2 53
Davis	20	75 06	1853.7	2 33	20	2 53
Brown's Island, Fredericksburg	18	77 27	1856.7	1 02	12	1 14
Mason's Landing	14	75 15	1856.6	2 23	12	2 35
Snead	37 58	75 26	1856.7	2 18	12	2 30
Joynes	42	75 37	1856.7	2 03	12	2 15
Mayo's Island, Richmond	32	77 26	1856.7	0 15	12	0 27
Scott	20	75 54	1856.7	1 37	12	1 49
Roslyn, Petersburg	14	77 24	1852.7	0 26	22	0 48
Cape Charles	07	75 58	1856.7	1 35	12	1 47
Old Point Comfort	00	76 18	1856.7	1 15	12	1 27
Cape Henry	36 56	76 00	1856.7	1 28	12	1 40
Norfolk	50	76 17	1856.7	1 36	12	1 48

NOTE.—The present annual increase is nearly 2¼′, and will probably not sensibly change for the next ten years.

*List of lights on Chesapeake bay and vicinity.**

Name of lights.	Latitude.	Longitude. In arc.	Longitude. In time.	Visibility in nautical miles, eye elevated 13 feet.
Approaches to the Chesapeake.	° ′ ″	° ′ ″	h. m. s.	
Assateague	N. 37 54 37	W. 75 21 04	5 01 24.2	14.6
Hog Island	37 23 16	75 41 35	5 02 46.4	13.2
Cape Charles, or Smith's island	37 07 48	75 52 12	5 03 28.8	14.0
Cape Henry	36 55 29	76 00 12	5 04 00.8	17.5
Hampton Roads.				
Willoughby's Spit Light-vessel	37 00.1	76 14.8	5 04 59	12.3 11.1
Old Point Comfort	37 00 02	76 18 06	5 05 12.4	12.3
Old Point Comfort Beacon Light, (approximate)	37 00.0	76 18.5	5 05 14	9.5
Craney Island, (approximate)	36 53.3	76 20.6	5 05 22	12.5
Naval Hospital, (approximate)	36 50.8	76 17.8	5 05 11	.....
James river.				
White Shoal, (approximate)	37 01.4	76 31.5	5 06 06	10.3
Point of Shoals, Burwell's Bay, (approximate)	37 03.8	76 39.2	5 06 37	10.3
Deep Water Shoals, (approximate)	37 08.2	76 38.0	5 06 32	10.3
Jordan's Point	37 18 43	77 13 06	5 08 52.4	11.1
Chesapeake bay.				
Back River	37 05 10	76 15 54	5 05 03.6	11.1
Cherry Stone, (approximate)	37 15.6	76 01.8	5 04 07	11.2

* Names taken from list of the Light-house Board.

List of lights on Chesapeake bay and vicinity—Continued.

Name of lights.	Latitude.	Longitude. In arc.	Longitude. In time.	Visibility in nautical miles, eye elevated 13 feet.
Chesapeake bay—Continued.	° ′ ″	° ′ ″	h. m. s.	
York Spit Light-vessel	N. 37 12.0	W. 76 13.7	5 04 55	11.6
New Point Comfort	37 18 00	76 16 22	5 05 05.5	13.2
Wolf Trap Light-vessel	37 23.3	76 10.0	5 04 40	11.4 10.6
Stingray Point, (approximate)	37 33.6	76 16.0	5 05 04	11.2
Windmill Point Light-vessel	37 34.8	76 11.5	5 04 46	11.0
Rappahannock river.				
Bowler's Rock Light-vessel	37 49.2	76 43.3	5 06 53	.....
Chesapeake bay.				
Watt's Island	37 46 53	75 53 18	5 03 33.2	12.1
Smith's Point Light-vessel	37 52.7	76 10.1	5 04 40	11.1 11.5
Jane's Island Light-vessel	37 57.6	75 55.4	5 03 42	10.6
Point Lookout	38 02 16	76 19 01	5 05 16.1	11.3
Potomac river.				
Piney Point	38 08 03	76 31 29	5 06 05.9	11.1
Blackstone Island	38 12 23	76 44 24	5 06 57.6	12.1
Lower Cedar Point Light-vessel	38 21	77 00.5	5 08 02	9.7
Upper Cedar Point Light-vessel	38 24	77 03.5	5 08 14	10.4
Fort Washington, (approximate)	38 43.4	77 01.2	5 08 05	.....
Jones's Point, (approximate)	38 47.4	77 01.4	5 08 06	11.1
Chesapeake bay.				
Fog Point	38 02 04	76 02 15	5 04 09.0	10.6
Hooper's Straits Light-vessel	38 13.0	76 05.0	5 04 20	11.0
Clay Island	38 13 53	75 58 08	5 03 52.6	11.2
Cove Point	38 23 07	76 22 36	5 05 30.4	12.1
Sharp's Island	38 37 44	76 21 55	5 05 27.7	11.7
Thomas's Point	38 54 25	76 26 53	5 05 47.6	13.5
Greenbury's Point, (approximate)	38 58.5	76 27.0	5 05 48	12.5
Sandy Point, (approximate)	39 01.0	76 23.5	5 05 34	12.5
Patapsco river.				
Bodkin Tower, (light discontinued)	39 08 02	76 25 10	5 05 40.6	.....
Seven-foot Knoll, (approximate)	39 09.3	76 23.9	5 05 36	11.9
North Point Lower Light	39 11 36	76 26 12	5 05 44.8	10.9
North Point Upper Light	39 11 46	76 26 36	5 05 46.4	11.8
Fort Carroll	39 12 50	76 30 55	5 06 03.7	11.3
Lazaretto Point	39 15 42	76 33 59	5 06 15.9	11.1
Upper Chesapeake bay.				
Pool's Island	39 17 23	76 15 41	5 05 02.7	11.1
Turkey Point	39 26 56	76 00 12	5 04 00.8	13.6
Fishing battery, (approximate)	39 29.6	76 04.7	5 04 19	11.2
Havre de Grace	39 32 23	76 04 47	5 04 19.1	11.6

NOTE.—Many of these lights are now probably extinguished, and light-boats may have been removed. The towers may still serve as day marks.