

XII.—REPORT OF OPERATIONS OF THE UNITED STATES STEAMER SPEEDWELL IN 1879, WHILE IN THE SERVICE OF THE UNITED STATES FISH COMMISSION.

BY LIEUT. Z. L. TANNER, U. S. N., *Commanding.*

All bearings true. Distances in geographical miles.

Prof. S. F. BAIRD,

United States Commissioner of Fish and Fisheries, Washington, D. C.:

SIR: I have the honor to submit the following report of the operations of the Speedwell during the season of 1879:

The vessel was put in commission at the navy-yard, Washington, D. C., at meridian July 1, and sailed for Provincetown, Mass., on the 9th; passed the capes of the Chesapeake on the morning of the 10th, New York at meridian of the 11th, arriving in Provincetown at 6.30 p. m. of the 12th, three days nine hours from Washington.

July 16, at 9.45, left Provincetown for Gloucester to get the dredging apparatus which was in store at that place. Having taken the necessary articles on board we left for Provincetown at 6.30 p. m., arriving at 12.30 a. m. the 17th. Experienced a violent gale and heavy swell while crossing the bay. The apparatus was landed at the wharf during the day, and at 5.40 on the 18th we left for Boston to procure coal. Arrived at the navy-yard at 11.45 a. m. the same day. Took on board 73 tons of coal on the 19th, and left at 9 a. m. on the 20th for Provincetown, arriving at 2.50 p. m.

Preparations for the work of dredging having been completed, we left the wharf at 9.30 a. m. on the 21st and lowered the dredge at 11.30 a. m. in 13 fathoms, Wood End light-house bearing N. 15° E. 10½', the current number of the haul being 239. Five hauls were made during the day with satisfactory results, except the temperature observations, which were incomplete, owing to our deep-sea thermometers (Casella Miller's) being out of order.

I shall not attempt to mention the various specimens taken, as I have not sufficient data at hand, and, in fact, their description falls legitimately to the scientific corps who had charge of the dredging operations.

We left the wharf at 10.30 a. m. July 22 and lowered the dredge at 11 a. m. in 25 fathoms, Race Point bearing S. 50° E. 1'. Four hauls were taken with dredge and trawl during the day in from 25 to 30 fathoms. The work was somewhat retarded by a heavy swell from the gale of last night, giving the vessel an uncomfortable motion and making it a mat-

ter of some difficulty to keep movable articles in place. Returned to the wharf at 6.30 p. m.

We were detained in port by a southerly gale during the 23d. At 1.30 p. m. on the 24th we got under way and attempted to use the dredge in Cape Cod Bay, but finding the wind and sea too heavy returned to the wharf at 4.30 p. m.

At 9.15 a. m. on the 25th, the weather being favorable, we went out into the channel between Stellwagen Bank and Race Point, where we found the swell quite heavy, giving the vessel an uncomfortable motion.

The dredge was lowered at 10.40 a. m. in 28 fathoms, $2\frac{1}{2}'$ N. 11° W. of Race Point. Four hauls of the dredge and three of the trawl were taken during the day, returning to the wharf at 7.45 p. m. A thick fog kept us at the wharf during the 26th. The 27th (Sunday) was squally and rainy.

At 8.15 a. m. on the 28th we steamed out to the Fishing Ledge, a rocky patch in Cape Cod Bay, S. 50° W. 7' from Wood End; the dredge was lowered at 10.15 a. m. in 17 fathoms. Nine hauls were made during the day, five with the dredge and four with the trawl. Returned to port at 6.50 p. m.

At 8 a. m., 29th, left the wharf and steamed outside of Race Point, lowering the dredge at 10.45 a. m. in 88 fathoms. Race Point bearings, S. 65° W. $14'$. Five hauls were made during the day in from 73 to 120 fathoms of water, two with the dredge and three with the trawl.

We were kept in port during the 30th by a thick fog. The weather cleared during the night, and, at 8 a. m. 31st, we got under way and steamed out to sea, lowering the dredge at meridian in 135 fathoms, Race Point bearing S. 82° W. $26'$. Four hauls were made, three with the trawl and one with the dredge, in from 135 to 42 fathoms. The soundings in Nos. 267 and 268 do not agree with the chart, and it is possible Race Point was mistaken for Cape Cod, when the bearings were taken. Returned to Provincetown at 7 p. m.

At 8 a. m., August 1, we stood out to sea, lowering the dredge at 9.30 a. m. in 34 fathoms. Race Point bearing S. 12° W. $2\frac{3}{4}'$. Seven hauls were taken during the day in from 34 to 42 fathoms, three with the dredge and four with the trawl, returning at 6 p. m. Fires were hauled, as the naturalists required the following day (Saturday) to arrange and preserve the large number of specimens on hand.

At 8 a. m., August 4, we left the wharf and lowered the dredge in 9 fathoms off Long Point, then steamed to the south end of Stellwagen Bank and took four hauls of the dredge and one with the trawl in from 12 to 31 fathoms, returning to port at 6 p. m.

There have been but few bottom and intermediate temperatures taken thus far, and those we have taken are not reliable, owing to the bad condition of the deep-sea thermometers. We received some new Negretti Zambra thermometers to-day, which seem to perform their work perfectly.

so that our observations will, doubtless, be more satisfactory in the future.

The 5th was spent by the naturalists in preserving the specimens procured yesterday. We steamed out of the harbor at 8 a. m. of the 6th, and lowered the dredge at 10 a. m. in 35 fathoms, Race Point bearing S. 44° E. 11'. Five hauls were made in from 35 to 45 fathoms, three with the dredge and two with the trawl, returning at 6.20 p. m.

The naturalists were employed during the 7th in preserving specimens. A gale blowing on the 8th and a thick fog on the 9th prevented our leaving the harbor.

At 9 a. m. on the 11th we steamed out of the harbor and lowered the dredge in 31 fathoms, Race Point bearing S. 86° E. 1¼'. Eight hauls were taken during the day in from 26 to 31 fathoms, five with the dredge and three with the trawl, returning at 6 p. m.

The 12th was spent in making some necessary repairs about the engine, and at 4 a. m. 13th we left for Boston to procure coal; arrived at 10.15 a. m. and made the necessary preparations for coaling. Mechanics were sent on board from the navy-yard to make some repairs in the engineer's department. The crew were occupied on the 14th coaling ship, having taken on board 73 tons. Repairs on the machinery were completed at 2 p. m. on the 15th, and at 2.25 we left the yard, arriving at Provincetown at 8.45 p. m.

The weather was unsettled during the 16th, 17th, and 18th, with foggy, rainy weather. During the evening of the 18th the wind increased to a gale from S.E. causing a heavy swell in the harbor. Several vessels drifted on shore and considerable damage was done in the bay. The sea was breaking over the wharf and vessel at midnight, and, fearing the former might not be strong enough to stand the force of the sea and the extra strain imposed upon it by the vessel, which was lying uncomfortably, surging heavily on her fasts, I ordered steam, and at 12.45 a. m. swung the vessel at the wharf, steamed out into the bay and anchored. The weather was very thick, the atmosphere being filled with mist and spray. At about 2.30 a. m. 19th the wind subsided after a furious squall, and at 3 a. m. came out from N.W. in a heavy squall, then settled to a moderate gale with clear, cold weather. The harbor being sheltered, with the wind from this direction, we returned to the wharf at 9 a. m.

The weather was clear and pleasant on the 20th with light variable winds. Although quite smooth in the bay, there was a heavy swell outside, from the gale of yesterday. We left the wharf at 9 a. m. and steamed across the bay, where we found the sea sufficiently smooth for our purposes, and at 11.20 a. m. lowered the dredge in 16 fathoms, the Gurnet lights bearing S. 79° W. 3¼'. Six hauls were made, two with the trawl and four with the dredge, in from 16 to 27 fathoms, generally muddy bottom. At 6 p. m. we returned to our wharf.

The sea was quite smooth on the morning of the 21st, and it was de-

cided to resume work outside of the cape. With this object in view we left the wharf at 7.45 a. m. and stood out to sea, lowering the dredge at 11.30 a. m. in 124 fathoms, Cape Cod light-house bearing S. 51° W. $16\frac{1}{2}'$. Four hauls were made, three with the trawl and one with the dredge, in from 118 to 124 fathoms. Returned to the wharf at 8.25 p. m.

The weather was unsettled and threatening during the 22d, with a fresh gale from S.W. on the 23d, detaining us in port. The 24th (Sunday) was cloudy with frequent squalls and passing fog-banks. Monday 25th, the weather was somewhat better. We left our wharf at 8.45 a. m. and stood out to sea, lowering the trawl at 10.10 a. m. in 30 fathoms, Race Point bearing S. 56° E. $5'$. Four hauls were made, one with the dredge and three with the trawl, in from 27 to 31 fathoms. The weather looking threatening we returned at 3.45 p. m.

We were detained in port during the 26th, 27th, and 28th by stormy weather. At 9.10 a. m., 29th, we steamed out into the bay and lowered the dredge at 9.30 a. m. in 21 fathoms, Wood End bearing N. 33° W. $\frac{1}{4}'$. Seven hauls were made in from 6 to 21 fathoms, one with the trawl and six with the dredge, returning to the wharf at 4 p. m. At 9 a. m., 30th, we left the harbor and lowered the dredge at 10 a. m. in 25 fathoms, Race Point bearing N. 3° W. $1\frac{3}{4}'$. Five hauls were made, three with the trawl and two with the dredge, in from 25 to 30 fathoms. Returned to the wharf at 3 p. m.

Monday, September 1, at 8 a. m., left the wharf and stood out to sea, lowering the dredge at 11.30 a. m. in 67 fathoms, Cape Cod light-house bearing S. 9° W. $10'$. Five hauls were made in from 45 to 83 fathoms, one with the dredge and four with the trawl, returning at 7.45 p. m.

We were detained in port during the 2d, 3d, 4th, and 5th by unfavorable weather, and were obliged to leave the wharf and anchor in the bay on the 4th during a S.E. gale. At 8 a. m., on the 6th, we steamed to the vicinity of Stellwagen Bank, and at 10.25 a. m. lowered the dredge in 17 fathoms, Race Point bearing S. 11° W. $7\frac{3}{4}'$. Eight hauls were made in from 17 to 28 fathoms, three with the dredge and five with the trawl, returning to the wharf at 6.10 p. m.

We were detained in port repairing trawls, &c., on the 7th, and by stormy weather on the 8th. At 7.15 a. m. on the 9th we left the wharf and steamed across the bay, lowering the dredge in 7 fathoms at 10 a. m., the Gurnet lights bearing N. 30° W. $1\frac{3}{4}'$. Seven hauls were made in from 7 to 18 fathoms, three with the dredge and four with the trawl. Returned to the wharf at 7.05 p. m.

We left the harbor at 8.15 a. m. on the 10th, and lowered the trawl at meridian in 94 fathoms, Cape Cod light-house bearing S. 22° W. $14'$. Three hauls were taken in from 94 to 130 fathoms. Returned at 9.45 p. m.

At 5.55 a. m., on the 11th, started for Boston for coal, arriving at 10.40 a. m. Commenced coaling about 1 p. m., finishing at 2 p. m., on the 12th, having received 86 tons. Mechanics from the navy-yard were employed repairing machinery. At 6 a. m., 13th, left the navy-yard, and at

8 a. m. lowered the dredge in 16 fathoms, Minot's Ledge light-house bearing south $3\frac{1}{4}'$. Seven hauls were made in from 16 to 30 fathoms, four with the trawl and three with the dredge, arriving in Provincetown at 6.25 p. m. The work was seriously interrupted during the latter part of the day by heavy winds and sea.

Monday, September 15, we left the wharf at 9.20 a. m., and lowered the dredge at 10.30 a. m. in $10\frac{1}{2}$ fathoms, Billingsgate Island light-house bearing S. 53° E. $4'$. Seven hauls were made in from 7 to 15 fathoms, four with the dredge and three with the trawl, returning at 6.10 p. m. It rained heavily during the 16th, with a fresh breeze from S.W., detaining us in port. The 17th commenced with overcast weather and moderate breeze from N.E., clearing up during the day. At midnight we left the wharf and stood out to sea, lowering the dredge at 6 a. m., on the 18th, in 105 fathoms, Cape Cod light-house bearing S. 86° W. $30'$. Six hauls were made during the day in from 70 to 108 fathoms, four with the trawl and two with the dredge. At 8.40 p. m. anchored off Chatham Light in 7 fathoms. Got under way at 5 a. m., on the 19th, and lowered the trawl at 6 a. m. in $7\frac{1}{2}$ fathoms, Chatham light-house bearing N. 45° W. $2\frac{3}{4}'$. Eight hauls were made in from $7\frac{1}{2}$ to 70 fathoms, six with the trawl and two with the dredge. Returned to Provincetown at 9.15 p. m.

The 20th we remained in port drying and repairing dredging apparatus, and were detained by unfavorable weather until 7 a. m., on the 26th, when we stood out to sea and lowered the trawl at 8.30 a. m., in 46 fathoms, Cape Cod light-house bearing S. 32° W. $5'$. In heaving in, the rope parted just as the trawl reached the surface; the trawl was lost. We bent another one and lowered it at 10 a. m. in 46 fathoms, Cape Cod light-house bearing S. 75° W. $6\frac{1}{2}'$. The rope parted again while heaving in. The spot was buoyed with the intention of grappling for the trawl.

The breaking of the rope was a surprise, as it was a new $3\frac{1}{2}$ -inch Italian hemp rope (at least we bought it for such), and should have borne a working strain of ten thousand pounds, whereas our hoisting-engine would not lift a third of that weight. The work was continued with the dredge during the day, making four hauls in from 46 to 96 fathoms, returning to Provincetown at 6.30 p. m.

We left the wharf at 7 a. m., 27th, with grapnels, &c., prepared to drag for the trawl. When we arrived near the spot we discovered our buoy and line on the deck of a schooner—they had picked it up during the morning. The exact location of the trawl was now unknown, but we dragged for several hours as near the spot as we could get by bearings, &c., without success, returning to Provincetown at 3 p. m.

Upon examination the rope was found to be very inferior in quality, and, a test being applied, it broke twice with a strain of less than two tons—probably not more than one.

The loss of our trawls brought the season's operations to a summary close, leaving a very interesting portion of the coast unexplored.

It will be seen by reference to the accompanying chart that the coast between Chatham and the Cape has not been examined. It was our intention to have done so, and, had it not been for the loss of apparatus so late in the season, it would have been accomplished. It was with much regret that we left this portion of the work incomplete, not only that it is prolific in marine life, but the steep slope of the projecting coast has caught the germs of various species of more northern fauna borne down by the Polar current which impinges upon this portion of our coast, and the low temperature of the water has completed their development.

Monday, September 29, we left the wharf at 7 a. m. and spent the day in taking serial temperatures, running a line across the bay to the vicinity of Plymouth, thence to the southern end of Stellwagen Bank, and to the eastward to 50 fathoms of water, then through the channel between Race Point and the bank, returning to port at 7.10 p. m.

It would be desirable, and it was our intention, to extend this series of observations considerably, but we were delayed much during the month by unfavorable weather, and the time had now arrived when the season's work must end.

We took on board the apparatus belonging to the United States Fish Commission on the 30th, and returned it to Gloucester October 1; leaving the latter place at 9.30 a. m. on the 2d, we arrived at the navy-yard, Boston, at 12.30 p. m. Commenced coaling at 1 p. m.; mechanics from the yard repairing machinery. Finished coaling at 3.30 p. m., 3d. Mechanics completed repairs at 3 p. m. 4th. Left the yard at 4.20 and arrived at Provincetown at 10.20 p. m.

Monday, October 6, we took on board a large number of marine specimens in tanks, the results of the season's work, a portion of them to be delivered to the Peabody Museum at New Haven, the remainder to the Smithsonian Institution, Washington, D. C. Everything was on board and properly secured at 8 p. m., and, at 5.40 a. m., 4th, we left Provincetown and proceeded to sea. Passed over Nantucket Shoals at meridian; passed Point Judith at 11 p. m., arriving at New Haven at 9.45 a. m. on the 8th. The articles consigned to the Peabody Museum were landed during the day, and, at 5.45 a. m., 9th, we left New Haven, passed Hell Gate at 1.30 p. m., arriving at the navy-yard, New York, at 2.30 p. m., where we stopped to fill our tanks with fresh water.

We left the navy-yard at 5.30 a. m., 10th, passed Barnegat at 1.05 p. m., Absecom at 4.30 p. m., Cape Charles at meridian, 11th, and anchored for the night in Cornhill harbor at 10.20 p. m. Got under way at 4.45 a. m., 12th, and arrived at the navy-yard, Washington, at 4.30 p. m. The articles consigned to the Smithsonian Institution were landed during the 13th, which completed the duties of the "Speedwell" under the United States Fish Commission for the season of 1879.

The vessel was subsequently ordered to accompany the United States

steamer Nipsic to Norfolk, Va., and left the navy-yard in company with that ship at 7.45 a. m. on the 16th, returning on the 19th, and was put out of commission at meridian, October 24, by order of the honorable Secretary of the Navy.

RECAPITULATION.

Number of days in commission.....	116
Number of days at the Washington Navy-Yard preparing for sea and going out of commission.....	16
Number of days making the trip from Washington to Provincetown and return..	8
Number of days making trips between Provincetown and Gloucester.....	2
Number of days making trips between Provincetown and Boston, including time occupied coaling.....	8
Number of days employed in other than commission work.....	11
Number of days detained in port on account of weather.....	28
Number of days detained in port by naturalists preserving specimens.....	3
Number of days detained in port repairing machinery, dredging apparatus, &c..	4
Number of days employed dredging and trawling.....	24
Number of days employed taking serial temperatures.....	1
Number of hauls with the trawl.....	76
Number of hauls with the otter trawl.....	2
Number of hauls with the Agassiz trawl.....	3
Number of hauls with the dredge.....	58
Number of hauls with the rake-dredge.....	9
Total number of hauls with trawls and dredges.....	148
Average number of hauls per day..... fathoms..	6
Average depth of water.....	36.6
Number of surface temperatures taken.....	169
Number of intermediate temperatures taken.....	130
Number of bottom temperatures taken.....	139
Total number of water temperatures taken.....	438
Number of air temperatures taken.....	160
Number of soundings taken..... miles..	1,081
Distance run while trawling and dredging.....	miles.. 2,041
Distance run making passages.....	miles.. 3,122
Total distance run.....	miles.. 45
Average daily distance run while dredging and trawling.....	miles.. 45

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Record of dredging of United

NOTE.—Thermometers used are practically correct, error being less

Date.	Thermometer used.	Number of observation.	Locality.	Time.	Tide.
July 21	Green, 2903	239	Wood End Light	N. 15 E., 10 $\frac{1}{2}$	11.30 a. m. Flood
21	do	240	do	N. 20 E., 9 $\frac{1}{2}$	12.30 p. m. do
21	do	241	do	N. 16 E., 4 $\frac{1}{2}$	2.00 p. m. do
21	do	242	do	N. 36 E., 2 $\frac{1}{2}$	3.15 p. m. do
21	do	243	do	N. 55 E., 1 $\frac{1}{2}$	4.15 p. m. do
22	do	244	Race Point Light	S. 50 E., 1	11.00 a. m. do
22	do	244 $\frac{1}{2}$	do	S. 27 E., 5 $\frac{1}{2}$	11.30 a. m. do
22	do	245	do	S. 7 W., 4	2.25 p. m. do
25	do	246	do	S. 11 E., 2 $\frac{1}{2}$	10.55 a. m. do
25	do	247	do	S. 20 E., 3 $\frac{1}{2}$	11.30 a. m. do
25	do	248	do	S. 1 W., 3 $\frac{1}{2}$	12.25 p. m. do
25	do	249	do	S. 13 W., 4 $\frac{1}{2}$	1.05 p. m. do
25	do	250	do	S. 9 W., 5 $\frac{1}{2}$	1.50 p. m. do
25	do	251	do	S. 23 W., 6 $\frac{1}{2}$	2.50 p. m. H. W.
25	do	252	do	S. 34 W., 6 $\frac{1}{2}$	3.55 p. m. Ebb
28	do	253	Wood End Light	N. 50 E., 7	10.15 a. m. do
28	do	254	do	N. 50 E., 7	10.45 a. m. do
28	do	255	do	N. 50 E., 7	11.30 a. m. do
28	do	256	do	N. 50 E., 7	12.15 p. m. do
28	do	257	do	N. 50 E., 7	12.45 p. m. do
28	do	258	do	N. 50 E., 9 $\frac{1}{2}$	1.15 p. m. do
28	do	259	do	N. 67 E., 10 $\frac{1}{2}$	2.20 p. m. Flood
28	do	260	do	N. 67 E., 7 $\frac{1}{2}$	3.30 p. m. do
28	do	261	do	N. 67 E., 3 $\frac{1}{2}$	4.15 p. m. do
28	do	262	Race Point Light	S. 65 W., 14	10.45 a. m. Ebb
29	do	263	do	S. 65 W., 14	11.25 a. m. do
29	do	264	do	S. 65 W., 15	12.15 p. m. do
29	do	265	Cape Cod Light	S. 30 W., 8	1.25 p. m. do
29	do	266	do	S. 42 W., 13	3.15 p. m. L. W.
31	Air, Green, 2903	267	Race Point Light	S. 82 W., 26	Meridian Ebb
31	Water, Miller	268	do	S. 84 W., 26	1.00 p. m. do
31	Cassella, 31486	269	Cape Cod Light	S. 67 W., 9	3.30 p. m. Flood
Aug. 1	do	270	do	S. 60 W., 7	4.20 p. m. do
1	do	271	Race Point	S. 12 W., 2 $\frac{1}{2}$	9.30 a. m. do
1	do	272	do	S. 2 W., 3	10.00 a. m. do
1	do	273	do	S. 40 W., 5 $\frac{1}{2}$	11.30 a. m. H. W.
1	do	274	Cape Cod Light	S. 11 E., 7	12.15 p. m. Ebb
1	do	275	do	S. 11 E., 7	1.25 p. m. do
1	do	276	do	S. 20 W., 6 $\frac{1}{2}$	2.15 p. m. do
1	do	277	Wood End	S. 70 E., 3	5.00 p. m. L. W.
4	Air, Green, 2903	278	Long Point	N. 75 E., 4	8.20 a. m. Flood
4	Water, Negretti	279	Race Point	S. 60 W., 6 $\frac{1}{2}$	10.45 a. m. do
4	Zambra, 43227	280	do	S. 71 E., 6 $\frac{1}{2}$	11.30 a. m. do
4	do	281	do	S. 12 E., 8 $\frac{1}{2}$	12.10 a. m. do
4	do	282	do	S. 3 W., 5 $\frac{1}{2}$	1.30 p. m. Ebb
4	do	283	do	S. 44 E., 8 $\frac{1}{2}$	2.15 p. m. do
6	do	1284	Race Point	S. 44 E., 11	10.00 a. m. Flood
6	do	285	do	S. 14 E., 14	12.07 p. m. do
6	do	286	do	S. 20 E., 16	12.45 p. m. do
6	do	287	do	S. 20 E., 10	2.07 p. m. H. W.
6	do	288	do	S. 20 E., 10	2.55 p. m. Ebb
6	do	289	do	S. 20 E., 10	2.55 p. m. do
11	do	290	do	S. 80 E., 1 $\frac{1}{2}$	10.00 a. m. do
11	do	291	do	S. 55 E., 1 $\frac{1}{2}$	10.30 a. m. do
11	do	292	do	S. 85 E., 2 $\frac{1}{2}$	11.20 a. m. L. W.
11	do	293	do	S. 84 E., 3 $\frac{1}{2}$	12.18 p. m. Flood
11	do	294	do	S. 86 E., 6 $\frac{1}{2}$	1.05 p. m. do
11	do	295	do	S. 82 E., 7 $\frac{1}{2}$	2.00 p. m. do
11	do	296	do	S. 82 E., 0	3.00 p. m. do
11	do	297	do	S. 80 E., 11	3.45 p. m. do
20	do	298	Gurnet Light	S. 70 W., 3 $\frac{1}{2}$	11.00 a. m. Ebb
20	do	298 $\frac{1}{2}$	do	S. 88 W., 4 $\frac{1}{2}$	1.00 p. m. do
20	do	299	do	S. 74 W., 4 $\frac{1}{2}$	1.30 p. m. do
20	do	300	do	S. 75 W., 5	2.15 p. m. do
20	do	301	Race Point	S. 65 E., 5	4.00 p. m. do
20	do	301 $\frac{1}{2}$	do	S. 65 E., 5	4.30 p. m. do
21	do	302	Cape Cod Light	S. 51 W., 16.5	11.30 a. m. Flood
21	do	303	do	S. 51 W., 15	1.00 p. m. do
21	do	304	do	S. 61 W., 15	2.30 p. m. Ebb
21	do	305	do	S. 68 W., 18	2.55 p. m. do
25	do	306	Race Point	S. 56 E., 5	10.10 a. m. do
25	do	307	do	S. 56 E., 4 $\frac{1}{2}$	11.04 a. m. do

*Surface temperature, No. 277, doubtful. †No results from No. 284, and no record kept.

States steamer Speedwell, 1879.

than 0°.5. Instruments read to nearest 0°.5. All bearings true.

Air.	Temperature.			Depth.	Character of bottom.	Wind.	Drift.	Implement used.
	Surface.	Intermediate.	Bottom.					
°	°	Faths.	°	Faths.				
70	67			13	b. m. f. s.			Dredge.
69.5	67			18	do			Trawl.
				19	do			Dredge.
72	67			21	b. m.			Trawl.
69	65.5			20	do			Do.
70	68			25	f. g. s.			Dredge and trawl.
				30	do			Do.
				28	do			Do.
66	63			28	do			Do.
66	63			34	do			Do.
66.5	63			32	crs. s.			Do.
65	62			30	do			Trawl.
66.5	62			30	crs. s. G.			Do.
66.5	60			24.5	do			Dredge.
66	62			27	f. g. s. G.			Trawl.
72	65			17	R.		NW.	Dredge.
75	65			21	S.		NW.	Do.
76	66			18	R.		NW.	Do.
78	68			16	do		NW.	Do.
78	68			16	do		NW.	Do.
72	64			20	m.			Trawl.
71	64			24	b. m.			Do.
74	65			25	do			Do.
74	63			26	do			Do.
71	65.5			88	do		NE.	Dredge.
71	65.5			88	do		NE.	Do.
71	65			80	do		SW.	Trawl.
71	65			73	G.		SW.	Do.
71.5	60.5			120	b. m.		SW.	Do.
70	68.5		41	135	do		SE.	Dredge.
71	67.5		42	129	do		SE.	Trawl.
70	64		39.5	53.5	G.		NW.	Do.
71	64.5		39	42	b. s. and G.		NW.	Do.
70	60		30	34	f. y. s.		WNW.	Dredge.
70	67		38	34	y. s.		WNW.	Trawl.
60	67		38.5	25	crs. y. s. and G.		WNW.	Dredge.
73.5	68.5		39	30	crs. y. s. bk. sh.		SE.	Do.
72	60.5		89.5	29.5	y. s. and G.		SE.	Trawl.
71	60		37.5	47	f. y. s. bk. sh.		SE.	Do.
74	74.5		42	28	g. m.		SE.	Do.
70	69.5		58	9	b. m.		SE.	Dredge.
74	63	0.5 f-44°	44	13.5	S. sh.		W.	Do.
71	63	0 f-52°	44	12	S.		W.	Trawl.
70	62.5	7 f-57° 5.	44	14	do		W.	Dredge.
72	61	7 f-45° 5.	43	15	S. G.		W.	Do.
71	65	16 f-41°	38.5	31	s. gm.		W.	Do.
69	68	18 f-40°	39	35.5	g. m.		NW.	Dredge.
71	67	10 f-40°	39	37	do		NW.	Do.
68	67	28 f-39°	39	47.5	do		NW.	Trawl.
72	67.5	10 f-44°	39	33	f. b. s. sh.		NW.	Do.
70	68.5	27 f-39°	38	45	f. g. s.		SE.	Do.
72	63.5		38	31	do	NW. 1.	N.	Dredge.
70	64		40	30	do	NW. 1.	SSW.	Trawl.
69	65		41	29	b. m. f. s.	NW. 1.	N.	Dredge.
66	69.5		39.5	27	g. m.	NNW. 2.	N.	Do.
66.5	60		39	26	do	NNW. 1.	N.	Trawl.
67	65.5		39.5	26	do	NNW. 1.	N.	Rake dredge.
68.5	65		39	26	do	NNW. 1.	N.	Dredge.
69	65		30.5	22	f. s.	NNW. 1.	N.	Trawl.
64	61.5		55.5	16	f. bn. s.	NNW. 1.	S.	Dredge.
68	50.5		44	20	bn. s. P.	NW. 1.	S.	Do.
66	61.5		45	21	f. bn. s.	NW. 1.	S.	Trawl.
68	61.5		45	20	f. bn. s. P.	W. 1.	E.	Do.
66	60		42.5	27	bn. m.	SSE. 1.	Nd.	Dredge.
68	60		42.6	27	do	SSE. 1.	Nd.	Rake dredge.
68	60		41	124	f. bn. m.	Calm.	W.	Dredge.
71	61.5		41	122	do	Calm.	W.	Trawl.
75.5	61.5		41	122	bn. m.	SSE.	W.	Do.
69	61		41	118	do	SSE.	SE.	Do.
63	61		41	80	do	N.	SE.	Do.
65	61	16 f-48° 5.	43.5	31	bn. m. f. s.	N.	SE.	Do.

Date.	Thermometer used.	Number of ob- servation.	Locality.	Time.	Tide.
Aug. 25	Water, N. Z., 43227.	308	Race Point S. 28 E., 5 $\frac{1}{2}$	12.55 p. m.	Flood
25	do	309	do S. 23 E., 5 $\frac{1}{2}$	1.30 p. m.	do
29	do	310	Wood End N. N. W., 1 $\frac{1}{2}$	9.30 a. m.	do
29	do	311	do S. 36 W., 1 $\frac{1}{2}$	10.00 a. m.	do
29	do	312	do N. N. W., 2 $\frac{1}{2}$	11.00 a. m.	do
29	do	313	do N. N. W., 3 $\frac{1}{2}$	11.30 a. m.	H. W.
29	do	314	do N. N. W., 31 W., 6	12.15 p. m.	Ebb
29	do	315	do S. 25 W., 7	12.55 p. m.	do
29	do	316	do N. N. W., 36 W., 5 $\frac{1}{2}$	2.15 p. m.	do
30	do	317	Race Point S. 3 W., 11 $\frac{1}{2}$	10.00 a. m.	Flood
30	Water, N. Z., 43230.	318	do N. 14 E., 2 $\frac{1}{2}$	10.30 a. m.	do
30	do	319	do N. 10 E., 1 $\frac{1}{2}$	11.25 a. m.	do
30	do	320	do N. 38 E., 1 $\frac{1}{2}$	12.30 p. m.	H. W.
30	do	321	do S. 62 E., 1	1.15 p. m.	Ebb
Sept. 1	do	322	Cape Cod Light S. 9 W., 10	11.30 a. m.	Flood
1	do	323	do S. 6 W., 11	12.30 p. m.	H. W.
1	do	324	do S. 2 W., 11	1.30 p. m.	Ebb
1	do	325	do S. 8 W., 13	2.50 p. m.	do
1	do	326	do S. 4 W., 12.5	4.15 p. m.	do
6	do	327	Race Point S. 11 W., 7 $\frac{1}{2}$	10.25 a. m.	Flood
6	do	328	do S. 11 W., 6 $\frac{1}{2}$	11.10 a. m.	do
6	do	329	do S. 17 W., 5 $\frac{1}{2}$	12.15 p. m.	do
6	do	330	do S. 8 W., 6	12.45 p. m.	do
6	do	331	do S. 2 W., 5 $\frac{1}{2}$	1.45 p. m.	do
6	do	332	do S. 6 E., 5 $\frac{1}{2}$	2.40 p. m.	do
6	do	333	do S. 18 E., 5 $\frac{1}{2}$	3.30 p. m.	do
6	do	334	do S. 28 E., 5 $\frac{1}{2}$	4.15 p. m.	H. W.
9	do	335	Gurnet Light S. 30 W., 1 $\frac{1}{2}$	10.00 a. m.	Ebb
9	do	336	do N. N. W., 40 W., 2 $\frac{1}{2}$	10.45 a. m.	do
9	do	337	do S. 58 W., 4 $\frac{1}{2}$	11.45 a. m.	do
9	do	338	do N. N. W., 60 W., 0 $\frac{1}{2}$	12.30 p. m.	Flood
9	do	339	Manomet Point S. 67 W., 3 $\frac{1}{2}$	1.45 p. m.	do
9	do	340	do N. N. W., 38 W., 6	3.00 p. m.	do
9	do	341	do S. 68 W., 9	4.00 p. m.	do
10	do	342	Cape Cod Light S. 22 W., 14	Moridian	do
10	do	343	do S. 33 W., 17.5	1.45 p. m.	do
10	do	344	do S. 35 W., 15	3.45 p. m.	do
13	do	345	Minot's Ledge Light South 3 $\frac{1}{2}$	8.00 a. m.	do
13	do	346	do West 5 $\frac{1}{2}$	9.30 a. m.	Ebb
13	do	347	do S. N. 06 W., 9	10.40 a. m.	do
13	do	348	Standish Monument S. N. 35 W., 10	11.50 a. m.	do
13	do	349	do S. 36 W., 13	12.55 p. m.	do
13	do	350	do S. 56 W., 13 $\frac{1}{2}$	3.15 p. m.	Flood
13	do	351	Race Point Light S. 74 E., 6	4.40 p. m.	do
15	do	352	Billingsgate Island Light S. 53 E., 4	10.20 a. m.	H. W.
15	do	353	do S. 78 E., 5	11.20 a. m.	Ebb
15	do	354	do S. 74 E., 6	12.30 a. m.	do
15	do	355	do S. 56 E., 7 $\frac{1}{2}$	1.40 p. m.	do
15	do	356	do S. 56 E., 7 $\frac{1}{2}$	2.15 p. m.	do
15	do	357	do S. 48 E., 5 $\frac{1}{2}$	2.40 p. m.	do
15	do	358	do S. 63 E., 5 $\frac{1}{2}$	4.20 p. m.	do
18	do	359	Cape Cod Light S. 86 W., 30	6.05 a. m.	L. W.
18	do	360	do S. 88 W., 30	7.15 a. m.	Flood
18	do	361	do S. 89 W., 36	9.15 a. m.	do
18	do	362	do S. 86 W., 21	11.40 a. m.	do
18	do	363	do S. 84 W., 20	1.30 p. m.	H. W.
18	do	364	do S. 75 W., 15	4.00 p. m.	Ebb
19	do	365	Chatham Light S. 45 W., 2 $\frac{1}{2}$	6.00 a. m.	do
19	do	366	do S. 55 W., 4 $\frac{1}{2}$	6.30 a. m.	do
19	do	367	do S. 67 W., 5 $\frac{1}{2}$	7.30 a. m.	do
19	do	368	do S. 84 W., 6	8.00 a. m.	do
19	do	369	do S. 78 W., 6 $\frac{1}{2}$	8.30 a. m.	do
19	do	370	do S. 75 W., 12	10.00 a. m.	Flood
19	do	371	do N. 72 W., 16	11.45 a. m.	do
19	do	372	do West 21	1.30 p. m.	do
20	Water, N. Z., 43227.	373	Cape Cod Light S. 32 W., 5	8.30 a. m.	Ebb
26	do	374	do S. 75 W., 6 $\frac{1}{2}$	10.00 a. m.	do
26	do	375	do S. 72 W., 7	11.00 a. m.	do
26	do	376	do S. 72 W., 7	11.50 a. m.	do
26	do	377	do S. 85 W., 13	1.15 p. m.	do
26	do	378	do S. 85 W., 7 $\frac{1}{2}$		

steamer Speedwell, 1879—Continued.

Air.	Temperature.			Depth.	Character of bottom.	Wind.	Drift.	Implement used.
	Surface.	Intermediate.	Bottom.					
64	01	Faths.		41	fs. bk. sh.	E.	W.	Dredge.
66	01	13f-47°	41	20	f. y. s.	SE.	W.	Trawl.
67	01	14f-54°	41	27	b. m. f. s.	W.	E.	Dredge.
67.5	01.5		49	10	do	W.	E.	Rake dredge.
68	02	8f-60°	50	15	m. s.	SW.	E.	Do.
67	01	8f-60°	55	15	b. m.	SW.	E.	Do.
68	01.5		01	10	ors. s.	SSW.	E.	Trawl.
69	03.5		56	6	ors. s. G.	SSW.	E.	Dredge.
50	02		03	8	do	NE.	WSW.	Do.
61	01	13f-59°	45	25	b. m.	NE.	WSW.	Trawl.
60	01	14f-53°	44	28	do	NE.	WSW.	Do.
60	00.5	13f-32°	45	28.5	do	North'ly.	South'ly.	Rake dredge.
63.5	01	14f-53°	44.5	29	f. g. s.	North'ly.	E.	Trawl.
65	01	14f-53°	44.5	29.5	do	SW.	NE.	Dredge.
68	00	17f-44°-34f-41°-50f-41°	40.5	67	S. bk. sh.	SW.	NE.	Trawl.
67.5	58	15f-50°-30f-42°-45f-41°	40.5	60	do	SW.	NE.	Do.
67	01	22f-42°	41	45	ors. s. sh.	SW.	NE.	Do.
67	00	42f-41°	40.5	80	g. m.	S. by E.	North'ly.	Do.
70	59	20f-51°	40.5	75	do	SW.	SE.	Agassiz trawl.
66.5	60		44.5	17	ors. s. bk. sh.	NW.	NW.	Dredge.
67.5	60.5		42	23	f. s. bk. sh.	NW.	NW.	Otter trawl.
69	00		42	20	f. bn. s. P.	NW.	NW.	Rake dredge.
67	00.5	13f-51°	42	26	do	NW.	NW.	Trawl.
		14f-54°	42	28	fine. br. S. bk. sp.	NW.	NW.	Do.
70	61	14f-51°	42	28	fine. br. S. sh.	NW.	NW.	Rake dredge.
71	01	14f-53°	43	27	do	NW.	NW.	Agassiz trawl.
74	01	14f-53°	42	27	fine. S. sp.	SSW.	SE.	Dredge.
69	01	5f-00°	55	7	S. gn. M.	SSW.	SE.	Trawl.
69	01	5f-50°	50	11.5	br. S. sp.	SSW.	SE.	Dredge.
70	02	10f-53°	47	16	gn. m. s.	NW.	SW.	Trawl.
71	02.5	5f-32°-5-10f-55°	40.5	18	S. bu. M.	NW.	SE.	Do.
76	03	5f-63°-5-10f-55°	47.5	15.5	do	NW.	SE.	Dredge.
66.5	03	5f-04°	49	14	do	NW.	SE.	Trawl.
63.5	03	5f-03°-10f-40°.5	41	15.5	gn. M. S.	NNE.	NNE.	Do.
63.5	58.5	50f-44°	41.5	94	bu. M.	NNE.	NNE.	Do.
64	57	25f-40°-50f-45°	41.5	116	do	NNE.	NW.	Do.
60	57.5	25f-45°-50f-43°	42	130	do	SSW.	SE.	Dredge.
60	62	10f-57°	47	16	S. bk. spk. sh.	SSW.	SE.	Trawl.
65	02	5f-01°-6-10f-52°	45	22	R. P. sh.	SSW.	SE.	Do.
65	01	5f-01°.5	46	20	S. bk. spk.	SSW.	SE.	Dredge.
68	02.5	10f-50°-15f-51°	46	10.5	S. G.	SE.	SE.	Otter trawl.
67	01.5	10f-52°-20f-47°	44	26	S. M.	SE.	SE.	Dredge.
72.5	01	10f-50°-20f-48°	43	31	br. M.	SE.	SE.	Agassiz trawl.
61.5	02.5	5f-64°	43	30	do	S.	SE.	Dredge.
61	04	10f-51°.5	62.5	10.5	S. G.	S.	SE.	Trawl.
76.5	03.5		40.5	14	gn. M.	NW.	SE.	Dredge.
66	05.5		02	7	ors. vl. S.	NW.	SE.	Do.
66	04		01	7	fine. S. P.	NW.	SE.	Do.
65	04		01	7	do	NW.	SE.	Do.
65	05.5		04	7.5	fine. br. S.	NW.	SE.	Trawl.
67	05		48	15	bu. M.	NW.	NE.	Dredge.
65	58.5	50f-42°	42	105	do	NW.	SE.	Trawl.
62	58.5	50f-44°	42	106	do	SSW.	NE.	Do.
63	58.5	50f-40°	44.5	102	do	SSW.	NE.	Do.
66	59.5	50f-40°.5	44	106	do	SSW.	NE.	Dredge.
66	00	50f-48°	44	108	M. fine. G.	SW.	NE.	Trawl.
63	00	30f-50°	46	70	S. brk. sh.	SSW.	N.	Do.
63	01.5		58	7½	ors. S.	SSW.	N.	Do.
63	01		52	11	fine. S.	SSW.	N.	Dredge.
63.5	01.5		51	12	do	SSW.	N.	Do.
63	01		57	15	ors. S.	SSW.	N.	Trawl.
64	01		54	18	do	SSW.	N.	Do.
66	57.5		50	18	S. spk.	SW.	NE.	Do.
61.5	01.5	20f-47°	84		do	NE.	NE.	Do.
58	50		70		S. P.	E.	W.	Do.
	54	20f-40°	46	40	fine. gy. s. bk. sp.	E.	NW.	Do.
64	55	15f-54°	46	40	do	E.	NW.	Do.
59	54	10f-51°	43.5	46	ors. S.	E.	NW.	Dredge.
59	54	10f-51°	48.5	46	do	E.	NW.	Do.
58	57	50f-45°	44	94	bu. M.		NW.	Do.
				90	do			Do.

Table of serial temperatures.

Date.	Thermometer used.	Number of observations.	Locality.	Time.	Tide.	Temperatures—air and water.						Depth.	
						Air.	Surface.	Fathoms.	Temperature.	Fathoms.	Temperature.		Bottom.
Sept. 25	Air, Green, 2903.	1	Long Pt., N. 67 W., 1	9.45 a. m.	Ebb	56	56	10	51	10	51	48	Faths. 17
25	Water, N. Z., 42663.	2	Wood End Lt. N. 45 E., 2	10.00 a. m.	do	55	55	10	52	10	52	47	21
29	do	3	do N. 45 E., 2	8.15 a. m.	Flood	59	59	10	50	10	50	45	22
29	do	4	do N. 80 E., 2	8.30 a. m.	do	57	57	15	46	15	46	44	24
29	do	5	do N. 55 E., 3	9.00 a. m.	do	57	57	5	56	10	46	45	21
29	do	6	do N. 48 E., 4	9.25 a. m.	do	58	58	5	57	5	57	45	21
29	do	7	do N. 45 E., 7	10.10 a. m.	do	58	58	5	56.5	10	53	46	21
29	do	8	do N. 45 E., 7	10.30 a. m.	do	58.5	58.5	5	57	10	56	46	19
29	do	9	do N. 68 E., 6	11.00 a. m.	do	59	59	5	57	10	54	45	24
29	do	10	do N. 88 E., 6	11.20 a. m.	do	59.5	59.5	5	57	10	55	44	26
29	do	11	do N. 75 E., 3	11.50 a. m.	E. W.	59.5	59.5	5	57	10	54	44	30
29	do	12	Race Pt. N. 71 E., 3	12.12 p. m.	Ebb	60	60	5	57	20	46	44	33
29	do	13	do N. 45 E., 4	12.40 p. m.	do	60	60	5	50	20	48	44	33
29	do	14	do N. 82 E., 6	1.00 p. m.	do	66	66	5	56	20	51	44	34
29	do	15	do N. 13 E., 5	1.25 p. m.	do	67	67	5	56	20	51	44	34
29	do	16	do N. 30 W., 6	1.45 p. m.	do	63.5	63.5	5	57	5	57	51	11
29	do	17	do N. 30 W., 6	2.10 p. m.	do	62.5	62.5	5	56	5	56	52.5	23
29	do	18	do N. 51 W., 8	2.35 p. m.	do	63	63	5	56	5	56	49	19
29	do	19	do N. 58 W., 6	3.00 p. m.	do	62.5	62.5	5	57	5	57	45	28
29	do	20	do N. 70 W., 6	3.30 p. m.	do	62.5	62.5	5	57	30	44	43	49
29	do	21	do N. 56 W., 5	4.00 p. m.	do	62.5	62.5	5	55	20	47	44	32
29	do	22	do N. 42 W., 5	4.30 p. m.	do	64.5	64.5	5	55	10	51	45	21
29	do	23	do N. 18 W., 2	5.10 p. m.	do	63	63	5	56	10	46	46	28
29	do	24	do N. 8 E., 2	5.45 p. m.	Flood	57.5	57.5	5	57	20	45	44	33
29	do	25	do N. 16 E., 2	6.15 p. m.	do	58	58	5	57	20	45	44	30
29	do	25	do N. 16 E., 2	6.15 p. m.	do	61	61	5	59	5	59	44	27

The following abbreviations are used in the foregoing report and tables:

- + . Dredge. Used on the chart.
- ⊙ Trawl. Used on the chart.
- Lt. Light, or light-house.
- Pt. Point.
- H. W. High water.
- L. W. Low water.
- °. Over figures—degrees.
- ′. Over figures—geographical, or sea miles.

Abbreviations of bottoms.

M., or m., for mud.
 S., for sand.
 G., for gravel.
 Sh., for shells.
 P., for pebbles.
 Sp., for specks.
 St., for stones.
 R., for rock.
 O., for ooze.

bk., for black.
 wh., for white.
 yl., or y., for yellow.
 gy., or g., for gray.
 bu., or b., for blue.
 gn., for green.
 br., for brown.
 fine., or f., for fine.
 ers., for coarse.
 brk., for broken.

The following examples will illustrate the use of the abbreviations of bottoms: ers. yl. s. bk. sp. brk. sh.—coarse yellow sand, with black specks and broken shells. Bu. m., or b. m., blue mud.

Very respectfully, your obedient servant,

Z. L. TANNER,
Lieutenant, Commanding.

