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REPORT OF THE SUPERINTENDENT

OF THE

# UNITED STATES COAST SURVEY,

SHOWING

THE PROGRESS OF THE SURVEY

DURING

THE YEAR 1874.

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tions of the several parties that were prosecuting work near Mosquito Inlet and on the shores of Tampa Bay.

In regard to hydrographic details, including the care and outfit of vessels, to which I have, as usual, given immediate attention, it is gratifying to record that official relations, maintained as heretofore with the Navy Department, have greatly advanced the interests of the service.

Assistant Henry Mitchell passed the winter in discussing observations which had been conducted and recorded, under his immediate direction, in the physical survey of New York Harbor. The results gave data of immediate value to General Humphreys, Chief of Engineers, General Newton, and myself, and much availed in our decision as the commission for establishing bulkhead and outer pier lines on the Long Island side of New York Harbor. While the office work connected with the physical survey was yet in progress, in February, at the joint request of the honorable Secretary of the Navy and of the commission on the construction of an interoceanic ship-canal, Mr. Mitchell was assigned, as an officer of the Coast Survey, to make, in conjunction with officers of the United States Engineers and others, a personal inspection of routes indicated by the several surveys which have been prosecuted in Central America under the direction of the Navy Department. The associated officers met together at Pensacola late in February, and, sailing immediately for Greytown, addressed themselves to the discharge of the assigned duties.

Following his own previous line of research, Mr. Mitchell noted, at the sea-outlets of the several proposed ship-canal routes, the changes likely to result from structures needful in establishing harbors for the shipping that must pass through from ocean to ocean. As far as practicable in the few weeks allowed for observing, the several localities were compared with other places, which, under similar conditions, are already much better known from continuous observations. The results of his inspection were embodied, at his return in June, in notes and remarks, which I have placed for future reference in the Appendix (No. 12) of this report, as foresight and general interest in the subject must hold until the great design is accomplished.

In July, Assistant Mitchell resumed operations in the physical survey of New York Harbor, and, in the course of the season, will conduct also a special hydrographic survey in Providence Harbor, R. I. These will be noticed in detail in my next annual report, in which the time covered by the surveys reported will conform with the fiscal year, ending with the month of June. Under appointment from the President of the United States, as a member of the commission to examine plans for improving the outlet of the Mississippi River, Mr. Mitchell will engage personally in that service during the coming winter.

#### SECTION I.

ATLANTIC COAST OF MAINE, NEW HAMPSHIRE, MASSACHUSETTS, AND RHODE ISLAND, INCLUDING SEAPORTS, BAYS, AND RIVERS.—(SKETCHES NOS. 2 AND 3.)

In making this report conformable with the limits of the fiscal year, the details of work done after the 1st of July will not be included. Mention, however, will here be made of the parties now in the field; and, in Appendix No. 1, the localities in which they are at work are given, as usual, in geographical order, each of the operations being marked as in progress. The recapitulation is as follows:

1. Deep-sea soundings between Nova Scotia and Cape Cod, developing depths in the coast-approaches through the Gulf of Maine, by the party of Commander J. A. Howell, U. S. N., assistant in the Coast Survey; Lieutenants W. H. Jacques, J. W. Hagenman, E. S. Jacob, and Richard Rush, and Master C. A. Bradbury, U. S. N., assistants.
2. Topographical survey of the western and north side of Mount Desert Island, Me., and soundings in the vicinity, by the party of Assistant J. W. Donn, aided by Messrs. F. C. Donn and F. H. Parsons.
3. Detailed survey of the shores of Eggemoggin Reach, coast of Maine, by the party of Assistant W. H. Dennis, aided by Mr. S. N. Ogden.
4. Topography of islands and ledges east and west of Isle au Haut and Deer Isle, Penobscot Entrance, by the party of Subassistant J. N. McOlintock, aided by Messrs. W. Fraser and T. A. Harrison.

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5. Plane-table survey of the eastern shore of Penobscot River, between Castine and Bucksport, by three parties in charge of Assistant A. W. Longfellow, Assistant Hull Adams, and Sub-assistant J. Hergesheimer, aided by Messrs. W. C. Hodgkins and R. B. Palfrey.
  6. Hydrography at the head of Penobscot Bay, including the lower part of Penobscot River, Me., by the party of Assistant Horace Anderson, assisted by Master Kossuth Niles, U. S. N., and aided by Mr. F. H. North.
  7. Determination of the co-efficient of refraction and of vertical height at the primary station, Ragged Mountain, near Camden, Me., by the party of Subassistant F. W. Perkins, aided by Messrs. C. L. Gardner and F. W. Ring.
  8. Tidal observations at North Haven, Penobscot Bay, by Mr. J. G. Spaulding.
  9. Soundings in the vicinity of Jeffrey's Ledge, Cashe's Ledge, and Jeffrey's Bank, surface and deep-sea temperatures recorded, and hydrography of the vicinity of the Isles of Shoals, by the party of Acting Master Robert Platt, U. S. N., assistant in the Coast Survey, aided by Mr. J. B. Adamson.
  10. Determination of geographical positions by triangulation in New Hampshire, under the charge of Prof. E. T. Quimby.
  11. Tidal observations at Boston by H. Howland.
  12. Pendulum-observations at a station near North Adams, Mass., and topographical survey to determine differences in the intensity of gravitation, by the party of Assistant C. S. Peirce, aided by Mr. W. E. McClintock.
  13. Hydrography continued to develop the character of changes in depth at the eastern approach to Nantucket Sound, by the party of Subassistant F. D. Granger, assisted by Lieut. R. D. Hitchcock, U. S. N., and aided by Mr. D. C. Hanson.
  14. Special examination and tests of sailing-courses between Narragansett Bay and New York, and supplementary hydrography in Long Island Sound, by the party of Assistant J. S. Bradford, aided by Mr. John Barker.
  15. Detailed survey of the shores and hydrography of Taunton River, Mass., by the party of Assistant A. M. Harrison, aided by Messrs. W. H. Stearns and Bion Bradbury.
  16. Special shore-line development and observations on tides and currents to determine the effect of proposed changes in the contour of Providence Harbor, R. I., by Assistants H. L. Whiting and Henry Mitchell, with a party in charge of Assistant H. L. Marindin.
- Tidal observations.*—The series of tidal and meteorological observations begun in January, 1870, at North Haven, in the entrance to Penobscot Bay, Me., has been carefully continued throughout the present year by Mr. J. G. Spaulding. His success in preserving unbroken the register of high and low waters, and the regularity and good form of the curves traced by the self-registering gauge, indicate that the position is favorable for the observations. This station is furnished with duplicate interchangeable cylinders, reading-box, and conveniences for regularly tabulating the readings of high and low waters, and hourly ordinates from curves as they are traced by the self-registering apparatus.
- At the Boston navy-yard, the observer, Mr. H. Howland, has continued as heretofore the series of tidal and meteorological observations. The gauge in use at this important station is one of the best of the old form, and, as far as possible, is guarded against stoppage by attached heating-apparatus for use during winter. In general, the series has been well preserved.
- A tide-gauge of the new form remains at Providence, R. I., where it was placed at the request of the city authorities. Last summer, the instrument was refurnished for continuing observations needed in the adjustment of levels in the local surveys; the running expenses, as heretofore, being met by the city. The apparatus and records will be returned to the Coast Survey Office, and will be of special use for comparison with the several short series of tidal observations recorded by sounding-parties while the hydrography of Narragansett Bay was in progress.

## SECTION II.

ATLANTIC COAST AND SEAPORTS OF CONNECTICUT, NEW YORK, NEW JERSEY, PENNSYLVANIA, AND DELAWARE, INCLUDING BAYS AND RIVERS.—(SKETCHES NOS. 4 AND 5.)

At the outset of the present fiscal year, parties were assigned to duty in this section, and are now engaged, as follows:

1. Plane-table survey of the shores and soundings in Thames River, Conn., above the navy-station at New London, by the party of Assistant H. G. Ogden, aided by Mr. D. B. Wainwright.
2. Topography of the shores of New Haven Harbor, Conn., by the party of Assistant R. M. Bache.
3. Positions of light-houses to be determined, at the eastern entrance of Long Island Sound, by Assistant J. A. Sullivan.
4. Hydrography of the channel westward of Plum Island, Long Island Sound, by the party of Assistant J. S. Bradford.
5. Special observations on tides and currents in the waters of New York Harbor, and soundings in the lower bay, by the parties of Assistant H. Mitchell, Assistant F. F. Nes, and Assistant H. L. Marindin, assisted by Master H. O. Handy, U. S. N., and aided by Mr. W. B. French.
6. Survey of the shores and hydrography of Port Jefferson, Long Island Sound, by the party of Assistant F. H. Gerdes, aided by Subassistant C. P. Dillaway and C. A. Ives.
7. Tidal observations in New York Harbor, by R. T. Bassett.
8. Selection of stations for triangulation to connect the survey of Hudson River with the survey of Lake Champlain, by the party of Assistant R. D. Cutts, aided by Mr. J. F. Pratt.
9. Shore-line survey of Lake Champlain from Whitehall north to the Four Brothers, and topography of Crown Point and Ticonderoga, by the parties of Assistant C. T. Iardella and Subassistant Andrew Braid, aided by Messrs. H. W. Bache, subassistant, and C. H. Sinclair.
10. Hydrography of Lake Champlain from Whitehall northward to Shelburne Bay, and development of shoals in the vicinity of Isle La Motte, by the party of Assistant Charles Junken, aided by Messrs. E. H. Wyvill and G. A. Morrison.
11. Latitude and azimuth determinations at Hudson, Crown Point, and Rouse's Point, N. Y., by the party of Assistant G. W. Dean, aided by Mr. A. G. Pendleton.
12. Shore-line survey and soundings in Great South Bay, Long Island, N. Y., by the party of Assistant Charles Hosmer, aided by Mr. John De Wolf.
13. Determinations of the magnetic declination, dip, and horizontal intensity at Ithaca and Oxford, N. Y., at Bethlehem, Penn., and at Cape May, N. J., by Mr. T. C. Hilgard.
14. Topography of the shores of Barnegat Bay, N. J., by the party of Assistant C. M. Bache, aided by Messrs. H. M. De Wees, subassistant, and J. J. Evans.
15. Soundings in the lower part of Barnegat Bay, N. J., and hydrography of the bar at Little Egg Harbor, by the party of Subassistant W. I. Vinal, aided by Mr. E. B. Pleasants.
16. Latitude and azimuth observations at Keyport and Barnegat, N. J., positions of light-houses at Cape May, and also in Delaware Bay at Maurice River, Mispillion Creek, and Hereford Inlet, by the party of Assistant Edward Goodfellow, aided by Mr. C. A. Ives.

While sounding in the vicinity of the Swash Channel, New York Bay, Assistant Nes found a shoal spot with less water than had been previously known. In order to determine the question whether or not similar lumps existed in the channel, a careful development was made by close soundings within an area of about four square miles, including the course through the Swash. These confirm in general the results of previous surveys, and, in addition, reveal the existence of a small spot, with only 16½ feet of water, on the west side of the Swash Channel.

In the field-operations of last year were included observations which served for determining the exact geographical position and length of the boundary-line between the States of New Jersey and New York. Due acknowledgment for that service has been made by the authorities of the first-named State, at whose instance the work was performed.

As one of the results of the subsequent labors of the State officer in tracing out the boundary-

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