

REPORT  
OF  
THE SUPERINTENDENT  
OF THE  
COAST SURVEY,  
SHOWING  
THE PROGRESS OF THE SURVEY  
DURING  
THE YEAR 1862.

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WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
1864.

# REPORT.

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COAST SURVEY STATION,  
*Near West Cheshire, Connecticut, November 7, 1862.*

SIR: I have the honor to submit my report for the surveying year ending November 1, 1862, as required by law and the regulations of the Treasury Department. With it is an engraved map showing the general progress of the survey, and a manuscript map prepared at the Coast Survey office, in accordance with the act of Congress of March 3, 1853.

The survey has been in progress, in its field or office work, in all the States of our coast—Atlantic, Gulf, and Pacific, though upon the diminished scale required by the diminished appropriations for the fiscal year. The officers and the work have rendered essential service to the fleets and armies of the Union. A brief and general statement of both these classes of operations will be given in the prefatory chapter (Part I) of this report, and a more detailed account in Part II.

The estimates for the next fiscal year, upon the same reduced scale as those of the past year, are contained in Part I.

The experience of the usefulness of the survey in the various war and blockade operations of the coast was hardly needed, to show that it ought to be pushed forward as rapidly as the means of the government will permit, if we would be prepared in those sections where danger may at any moment be imminent. The flows and ebbs of public feeling on that subject during the past year demonstrate the necessity of such preparation.

I have taken the opportunity, presented by the visits of inspection of the chief engineer, General Joseph G. Totten, to inform myself personally, through the kindly official and personal relations between us, of the progress and direction of the plans for defences on the coast, with a view to special reference thereto in the progress of the surveys. I was much gratified to find that as far as we had advanced the progress was in the right direction, though I could not but recognize that the information obtained would enable me in the future to make the connexion even more intimate than in the past, when no such exigencies as are now probable seemed to be among the possibilities of the times. I would be glad to make rapid provision for these exigencies, could adequate means be furnished. Perhaps some opportunity may yet occur to carry out such a purpose. It is certain that accurate maps must form the basis of well-conducted military operations, and that the best time to procure them is not when an attack is impending, or when the army waits, but when there is no hindrance to, or pressure upon, the surveyors. That no coast can be effectively attacked, defended, or blockaded without accurate maps and charts, has been fully proved by the events of the last two years, if, indeed, such a proposition required practical proof. The persons employed upon the various coasts being in the service of the government, their personal experience has been available in the various and complicated duties of pilotage, for lighting, for placing beacons, buoys, &c., in times of exigency, and during the derangement of regular modes of supply and inspection.

The honorable Secretary of the Navy has mentioned in his report the services of the Superintendent of the Coast Survey, as a member of the commission, in reference to plans of blockade, &c., and has since, with your approval, placed him on an important commission for selecting a site for a navy yard for iron clads and iron vessels, in order to lay the foundation of an iron navy. The indispensable usefulness of the Coast Survey results to these two commissions was generously acknowledged by votes of each without dissent. The resolution passed by the second board, transmitted to me by its president, Admiral Stringham, will be found in the Appendix No. 37. The communication from the president of the first board, Admiral DuPont, was given in the Appendix of my last annual report.

It will be observed that though general publications of maps and charts are made, the government has always more advanced and fresher information than other parties, whether domestic or foreign, and that due

discretion has guided us in the mode of publication and distribution of new maps and charts and of new information.

The zeal with which the Coast Survey officers have thrown themselves into such service as the government required is truly commendable, and has procured for them the praise of the distinguished army and navy officers under whose immediate direction they have served.

#### GENERAL STATEMENT OF PROGRESS.

The general sketch of progress (No. 45) shows that the triangulation, primary or secondary, of the Atlantic coast is continuous from our northeastern boundary to south of the line between North and South Carolina, and, with an interval of about sixty miles, from Winyah bay, S. C., to Matanzas inlet, south of St. Augustine, Fla.

This year three triangulation, six topographical, and two hydrographic parties have worked upon the coast of Maine. The triangulation (Sketch No. 2) includes Eastport harbor, and that of the sea-coast is complete from Machias bay to Mount Desert, and from the entrance and approaches of Isle au Haut bay, including Penobscot bay, to Kittery, Me. The topography is about two seasons behind the triangulation, and the hydrography is proportionately advanced. This season's topographical work on the coast of Maine has been in the neighborhood of Eastport, at Frenchman's bay, below Rockland harbor, along the water passages which connect the Sheepscot and the Kennebec, in the upper part of Casco bay, and near Portland, (a reconnaissance for defensive purposes.) The hydrography has been that of the water connexions between the Sheepscot and Kennebec rivers, including also Wiscasset bay, the upper part of Casco bay, including Yarmouth and Freeport rivers, and supplementary work near Portland.

The work on the coast of New Hampshire and Massachusetts (Sketch No. 3) is nearly completed. During the past season a hydrographic party has added to the previous work. The special surveys in Boston harbor have been continued. Two topographical and one hydrographic party have worked on the coast of Rhode Island, one of each class co-operating in the examination by the navy yard commission. The tidal and magnetic observations have been kept up at Eastport, and the tidal observations at Boston. Two triangulation parties, one also making astronomical observations, have been working on the coast of Connecticut (Sketch No. 3) near New Haven, and on the Connecticut river below the head of tide.

Two triangulation, one topographical, and one topographical and hydrographic party have worked on the coast of New York and New Jersey; on Hudson river, (Sketch No. 11,) near Rhinebeck and Poughkeepsie, and above Tivoli; near the western end of Long Island, and on the ocean shore of New Jersey, (verification survey.) Tidal observations have been kept up at Brooklyn, New York. Examinations of hydrographic changes have been made in the Delaware river, near Fort Delaware, and near the mouth of the Schuylkill, in Delaware, New Jersey, and Pennsylvania. Magnetic observations for the secular change of the declination and intensity have been made in New York and Pennsylvania, (Sketch No. 47.) The rate of progress on the coast of Sections I and II, (Maine to Maryland,) has quite equalled the estimates made in my reports for 1857 and 1859. Five parties triangulating and sketching in shore-line and the topography of the banks of the Potomac, (Sketch No. 13,) and co-operating through one chief, have finished the preliminary survey of that river from Blakistone island up to Georgetown. These, while at work, were in part protected by the Potomac flotilla, in part by the army detachments on the banks, and in part worked freely without need of protection. A hydrographic party is still engaged and will complete the soundings of the Potomac below Indian Head. The same party had previously rendered good service in the North Atlantic blockading squadron, in the York, Pamunkey, and Mattaponi rivers. An additional hydrographic party has sounded the Potomac between Alexandria and Georgetown, there being great need for a chart of the river near Washington.

Two topographical parties have mapped the environs of Williamsport, Maryland, for the use of the army; another was for a short period employed in the topography of military defences near Fort Lincoln; one is now engaged in the vicinity of the District line near Bladensburg in plane-table work for military purposes; a survey was made by another of the rebel position and works at Manassas; a fifth party is now engaged in mapping the western approaches of Fort Marcy, in Fairfax county; another party surveyed the north bank of the Rappahannock at Fredericksburg, and sketched the roads leading to the Potomac; and a seventh made reconnaissances and surveys on the Peninsula, between the York and James rivers. These parties worked under the immediate direction of the chief topographical engineers of the armies of the Potomac and Rappahannock.

Two topographical parties with the army of Maryland worked on the eastern shore of Virginia, near Drummondtown and Norfolk, and one of them made a hydrographic resurvey of Metomkin inlet.

There are now (November 7) four topographical parties surveying with the different corps of the army under General McClellan along the line of the Potomac. Observations have been made at the Washington magnetic station, and the tidal observations have been continued at Old Point Comfort, Va.

On the coast of North Carolina (Sketch No. 21) a resurvey was made of Hatteras inlet at the opening of the present surveying year, and it was in part re-examined subsequently, and service in marking by buoys and stakes rendered there, in connexion with the North Atlantic blockading squadron, by a second Coast Survey party. Oregon inlet was completely surveyed by a third party, which also made examination of the tides and currents and of their action upon the site of Fort Hatteras. The same parties, last named, made a reconnaissance of the Neuse river to a point above Newbern, and placed channel stakes and buoys on the middle ground. Service was rendered in the attack upon Roanoke island. As soon as Beaufort, N. C., was taken by our forces, a hydrographic party was sent there and made a resurvey, tracing anew portions of the shore line, and sounding the bar, the entrance, and the interior of the harbor. Some useful observations were communicated to us, by permission of the Navy Department, by one of the officers of the blockading squadron, who had been supplied with instruments from the Coast Survey office. These parts of the coast had been recognized as changeable in our operations of previous years.

On the coast of South Carolina, (Sketch No. 25,) Georgia, and Florida, acting under the immediate direction of the flag officer of the South Atlantic blockading squadron, were four parties, one of which had officers for all the surveying operations and a steam vessel; another for topography and hydrography, and two for topography, which were led by officers of experience upon this part of the coast—co-operating with each other through one chief and under the orders of Flag Officer DuPont. The operations of these parties, which received much commendation, will be given in detail under the head of Section V, only the surveying service being referred to here. Stono inlet and river, and parts of Folly and Kiawah rivers were sounded out, the bar having entirely changed. The banks of those streams were traced and mapped. Part of North Edisto river was resurveyed; part of St. Helena sound, and part of Port Royal sound, including Broad and Beaufort rivers and their tributaries, and also Skull creek and Calibogue sound; part of Tybee Roads, Ga.; part of Wassaw sound; part of St. Simon's sound, and the bar at Fernandina, Fla. Buoys were placed and sailing directions furnished to the flag officer. In connexion with the hydrography, the shore-lines were also traced of parts of John's, James', Cole's, Kiawah, and Folly island; of the inside of Port Royal island, and of parts of Broad river, S. C., and its tributaries. Officers were furnished to reconnoitring expeditions afloat and ashore.

The survey of the Florida reef (Sketch No. 32) was continued by a hydrographic party with a steamer, one triangulation, and one topographical party; and magnetic observations by photography were kept up at Key West.

On the coast, from Mobile entrance to New Orleans, (Alabama, Mississippi, and Louisiana—Sketch No. 35,) a very strong party with a steam vessel lent by the Navy Department, including assistants familiar with the different operations of the survey and with this part of the coast, made reconnaissances; determined the best channels of the mouths of the Mississippi, and buoyed that of the Southwest Pass; gave positions and distances for stationing the mortar boats near Fort Jackson, and other useful services which have been acknowledged by the flag officer of the western Gulf blockading squadron, and by Commodore D. D. Porter, under whose immediate direction they acted. The same party made examinations of localities designated by General Butler, U. S. A. One of the surveying officers was immediately connected, for some time, with Flag Officer Farragut in the Hartford. Two topographical parties were detailed, at the request of General Halleck, and under orders of his aide-de-camp, Colonel R. D. Cutts, Assistant in the Coast Survey, to make military surveys of the ground occupied and commanded by the defensive works erected at St. Louis in 1861. These surveys are nearly completed.

Arrangements are now making for the detail of parties to accompany the expedition of General Banks to the coast of Texas, and Commodore Porter's to the Mississippi.

On the Pacific coast, in Sections X and XI, (Sketches Nos. 37, 38, and 42,) one triangulation party, one triangulation, topographical, and hydrographic, two topographical, one of them a double party, and one hydrographic party, have been employed. The triangulation of San Clemente island (one of the Santa Barbara islands) and of the main between San Pedro and Point Duma, has been completed. The topography of Bodega bay has been completed in connexion with the coast adjacent south to Tomales, and several miles north of Bodega entrance. Soundings for verification have been made in Karquines strait, opposite to Mar-

tinez; also at the junction of the strait with the channel to Mare Island navy yard, and off Point Wilson, in San Pablo bay. The hydrography of Bodega bay has been completed, including the roadstead and that of the coast between it and Tomales entrance. Tidal observations have been continued at San Diego and San Francisco, besides those in connexion with the hydrography. The steamer Active has assisted in guarding the navy yard at Mare island in time of emergency.

The hydrography of Koos bay, Oregon, (Sketch No. 43,) has been extended; and the bar and entrance of Gray's harbor, W. T., have been sounded. Tidal observations has been continued at Astoria.

The diminished appropriation for the western coast has required the withdrawal of one of the parties. The steamer Active being much out of repair, a favorable opportunity was taken to dispose of her. She will require to be replaced when a proper opportunity occurs.

**OFFICE-WORK.**—The regular work of computing, drawing, photographing, lithographing, engraving, and electrotyping has gone on in the office. Many of the charts for the memoirs for distribution to officers of the army and navy connected with coast expeditions have been executed in a preliminary way by lithographing. Some, of which but a few copies were required, have been photographed. Photography, as a mode of reduction of field-work to the publication scale, has become a part of the regular routine of the office.

It will be necessary soon to make some reduction in the number of persons employed in the office; in fact, it has been commenced, but it is hoped that it may not be necessary to extend it much further, as the work requires thorough training to be effectively executed, and it will be difficult to recover our trained computers, engravers, and others, should they once become engaged in other offices.

The titles are here appended of drawings for maps and charts and of the engraved plates worked on during the year which ended on the 1st of November:

*Section I.*—The drawing for a finished chart and the engraving in a preliminary form of Barnstable harbor have been completed; the engraving of Portland harbor as a finished chart, with additions to the hydrography, has been nearly completed; and a preliminary chart of Mount Hope bay has been drawn and engraved. Progress has been made in the drawing and engraving of coast charts No. 8, Seguin island to Kennebunkport, Me.; No. 9, Cape Neddick to Cape Ann, Mass.; and No. 11, Plymouth to Hyannis, Mass.; and of the chart of Sheepscot and Kennebec rivers, Me. The drawing of general coast charts No. I, Quoddy Head, Me., to Cape Cod, Mass.; No. II, Cape Ann to Gay Head, Mass.; and of coast chart No. 7, Muscongus bay to Portland, Me., has been continued; and the engraving of coast chart No. 7, Muscongus bay to Portland, Me., and the drawing and engraving of No. 10, Cape Ann to Plymouth, have been commenced. Additions have been made to the chart of Salem harbor and to coast charts Nos. 12 and 13, Nantucket sound and Vineyard sound, as also to the progress sketches of the section; and a new progress sketch of the coast of Maine has been drawn and engraved.

*Section II.*—The engraving in outline of the new edition of coast chart No. 21, New York bay and harbor, has been completed, and the chart issued in a preliminary form; the drawing of the same as a finished chart has been continued. Progress has been made in the drawing and engraving of the Hudson river, (sheet No. 1,) from New York to Haverstraw, and in the drawing of sheet No. 2, Haverstraw to Poughkeepsie; the engraving of the latter has been commenced; and additions have been made to the progress sketch of the section.

*Section III.*—The engraving of coast chart No. 35, Chesapeake bay, (sheet No. 5,) from Pocomoke sound to York river, has been completed; progress has been made in the engraving of coast chart No. 36, Chesapeake bay, (sheet No. 6,) mouth of York river to entrance of bay; and of Patuxent river, lower sheet, as a finished chart. The drawing of Potomac river chart in four sheets, and the engraving of general coast chart No. IV, Cape May to Currituck sound, and of Potomac river, (sheet No. 3,) from Lower Cedar Point to Indian Head, have been commenced. Additions have been made to coast charts No. 31, head of Chesapeake bay to Magothy river; No. 32, Magothy to the Hudson river, Md.; No. 33, from the Hudson to the Potomac river; and to the progress sketch of the section. The following preliminary charts and maps have been lithographed and issued to meet the immediate wants of the public service, viz: Atlantic coast, from Chesapeake entrance to Ocracoke inlet; Chincoteague bay; Hampton roads; James river, up to City Point, (new edition;) reconnaissance of Pamunkey and Mattaponi rivers; Potomac river, up to Georgetown, in four sheets; road map of District of Columbia; plan of wharves at Alexandria; military reconnaissance map of southeastern Virginia, in nine sheets; and a general map of Virginia, in colors.

*Section IV.*—The engraving of coast chart No. 37, Atlantic coast, from Cape Henry to Currituck sound, has been commenced; and preliminary charts of Hatteras inlet (resurvey of 1861) and of Beaufort harbor, N. C., (resurvey of 1852,) have been drawn and lithographed.

*Section V.*—The engraving of Sapelo sound, Ga., Ossabaw sound, Ga., and of St. Simon's sound, Brunswick harbor, and Turtle river, as finished charts, has been completed. The drawing of general coast chart No. VII, Atlantic coast, from Winyah bay, S. C., to St. John's river, Fla.; and that of Calibogue sound and Skull creek, forming the inland passage from Tybee roads to Port Royal sound; and the engraving of Savannah river as a finished chart, have been in progress. Additions have been made to the progress sketch of the section. The following preliminary charts have been drawn and lithographed for immediate use, viz: Sea-coast of South Carolina; sea-coast of Georgia and Florida to St. Augustine; Port Royal entrance, with Beaufort, Broad, and Chechessee rivers; Calibogue sound and Skull creek; Wassaw bar; St. Helena sound; the addition of James island and Stono river to the chart of Charleston harbor; and a chart of Stono inlet, with parts of Stono, Folly, and Kiawah rivers, from the survey of the present year.

*Section VI.*—The drawing and engraving of the chart of St. Augustine harbor, and the engraving of St. Mary's river and Fernandina harbor, have been completed. Progress has been made in the drawing and engraving of general coast chart No. X, Florida reef, from Key Biscayne to Marquesas keys, and coast chart No. 71, New-found harbor key to Boca Grande; the engraving of coast chart No. 70, Garden key to Lower Matecumbe key, has been commenced; and the annual additions to the progress sketches of the section have been made. A preliminary chart of the vicinity of the Tortugas, Fla., has been lithographed.

*Section VII.*—A sheet showing the entrance to Santa Rosa bay, and a general chart of the northeastern part of the Gulf of Mexico, in two sheets, have been drawn and lithographed for the use of the blockading squadron. The engraving of the chart of Maria de Galvez bays, Fla., has been completed.

*Section VIII.*—The engraving of coast chart No. 93, Lakes Borgne and Pontchartrain, has been commenced. Additions have been made on coast chart No. 92, western part of Mississippi sound, and to the progress sketch of the section; and a hydrographic sketch of the southwest pass of the Mississippi has been lithographed. Drawings and photographs have also been made of the approaches to Fort Jackson and Fort St. Philip, below New Orleans, and of a survey of Fort Jackson after the bombardment.

*Section IX.*—The drawing of coast chart No. 108, Matagorda and Lavaca bays, Texas, and of general chart No. XVI, Gulf coast, from Galveston bay to the Rio Grande, has been continued; progress has been made in the engraving of chart No. 106, Gulf coast, from Galveston bay to Oyster bay, Texas; and the annual additions to the progress sketch of the section have been made. A general chart of the northwestern part of the Gulf of Mexico, in two sheets, has been drawn and lithographed for the use of the blockading squadron.

*Section X.*—The drawing of Napa creek and Petaluma creek, as finished charts, and the engraving of the same in preliminary form, have been completed; and a preliminary chart of Tomales bay has been drawn and engraved. The engraving of the chart of San Pablo bay is nearly completed, and progress has been made in the drawing and engraving of that of Drake's bay. The drawing of the lower part of San Francisco bay, and of a chart of the Pacific coast from Point Pinos to Bodega Head, has been commenced. Additions have been made to the progress sketches of the section, and to plates of charts previously engraved.

*Section XI.*—A preliminary chart of Koos bay, Oregon, has been drawn and engraved; and the drawing and engraving of a new edition of the chart of Washington sound, W. T., and the engraving of that of Coquille river entrance, Oregon, have been completed. Additions have been made to the progress sketch and other plates of the section.

#### COAST SURVEY SERVICE WITH BLOCKADING SQUADRONS AND WITH ARMIES IN THE FIELD.

Though the statements of the use made of the Coast Survey parties in different important military and naval expeditions will be given in the body of my annual report, with the acknowledgments made by their chiefs, it will conform to the general plan of this report to make a brief abstract of them here. The services at Port Royal and in the Lower Mississippi, where the survey gained so much credit, were only a fractional part of those rendered.

Three Coast Survey steamers have been kept at work during nearly the whole season—the Corwin, the Bibb, and the Vixen—being, when not actually employed by the survey, used by the Navy Department. The services of the Vixen, under command of Assistant C. O. Boutelle, were acknowledged by Admiral DuPont in his official report of the action at Port Royal. The familiarity of her commander with that part of the coast made his personal services of the greatest importance.

The Sachem, lent to the Coast Survey by the Navy Department, in place of the Hetzel, was also officered and manned by a surveying party. She accompanied the expedition to the Lower Mississippi, and there rendered services which have been warmly acknowledged by Admiral David D. Porter.

The Corwin, when not engaged in her regular work—as at Hatteras and in the Potomac—was under the orders of Admiral Goldsborough, and performed good service in York river and its tributaries—the Pamunkey and the Mattaponi. Reference to these several localities, in full detail, will be made under the heads of Sections III and IV, Section V and Section VIII, and in the first of these will also be stated the service of topographical parties for military purposes in the State of Virginia. No opportunity has been lost to furnish for the public service officers familiar with the parts of the coast which have been visited by our fleets and military expeditions.

The operations here alluded to have, in general, been executed by the civil assistants, sub-assistants, and aids of the Coast Survey; all the naval officers but one, and all the officers of the army, having been detached from the work and returned to their respective services.

Six of the civil officers of the survey have, under your authority, received furloughs, without pay, to join the volunteer service, and have shown great capacity in their several positions. Another, formerly an officer of the corps of engineers, has been absent from the office temporarily, and is yet under the orders of the chief engineer.

Sixteen officers of the survey, of different grades, have been detailed for service, chiefly topographical, with the army of the Potomac, near Washington, in the Peninsula, and on the Upper Potomac; with the army of the Rappahannock, near Fredericksburg and at Manassas; with the army of Maryland and Virginia, on the Eastern Shore and at Norfolk; and with the army of North Carolina, at Hatteras, Roanoke island, Newbern, and Beaufort, N. C.

The regular work has gone on upon the Florida reef, and parties were at and near Key West, ready to co-operate with the army if active operations had been deemed advisable on the western coast of the Florida peninsula.

The regular work on the Pacific coast has gone steadily forward.

Of seventeen assistants, fourteen sub-assistants, and eighteen aids, serving in the field or afloat, fifteen assistants, eleven sub-assistants, and fifteen aids have devoted the whole or a part of the year to the regular progress of the survey; and eight assistants, ten sub-assistants, and fourteen aids (thirty-two officers) have rendered service in connection with the operations of the army and navy, generally in addition to their regular duties. This last-named service was, of course, not without its special dangers. Sub-Assistant Dorr narrowly escaped when the lamented Wagner and a soldier of Mr. Dorr's plane-table party were mortally wounded in front of Yorktown. The plane-table which Mr. Dorr was using was shattered to pieces. Sub-Assistant Oltmanns was badly wounded in the breast by a Minie ball during the reconnaissance of Pearl river, while attached to the steamer Sachem, which was then under command of Assistant F. H. Gerdes, and serving with the flotilla of Commodore (now Admiral) D. D. Porter.

The bravery of Mr. J. S. Bradford, Mr. C. H. Boyd, and their comrades, of the party of Assistant Boutelle, alone saved them from capture on James island, S. C., and put in their hands several prisoners, who were delivered to the custody of the flag-officer of the squadron.

Of the officers who have thus served, the chiefs of parties—Assistant Charles O. Boutelle, under Admiral DuPont, and Assistant F. H. Gerdes, under Admiral D. D. Porter—have made themselves especially useful, and have won the special commendations of the gallant officers under whom they served. A more satisfactory view of the *personnel* of the service alluded to will be found in the Appendix, (Nos. 28 and 29,) showing the details made during the year when the changes were the greatest, as in the months previous to June, compared with those between June and November.

#### MAPS AND CHARTS.

In my general reports for 1856, 1857, and 1858, I gave an account of the several series of sheets intended to show the topography and hydrography of the Atlantic and Gulf coast. These were one hundred and thirteen coast or in-shore maps and charts, in forty-two series, on a scale of  $\frac{1}{300000}$ ; sixteen general or off-shore charts, on a scale of  $\frac{1}{400000}$ ; and harbor maps and charts on various scales, from  $\frac{1}{30000}$  to  $\frac{1}{60000}$ . In advance of these was a preliminary series, thirty-three in number, upon a scale of  $\frac{1}{200000}$ , intended to provide for the publication of the coast hydrography as soon as possible, when the number of sounding parties was at the maximum, and without the addition of the details of topography. Several of these were published in previous years; but of late it has been found more expedient to issue charts on either of the scales, as preliminary, or with only the shore-line, it not being in all cases practicable to continue the hydrography with strict reference to the completion of sheets which might be in progress in the drawing and engraving divisions.

Of the series first mentioned (in-shore maps and charts) twenty-five have been published, representing the most important parts of the coast, and fourteen are yet in the hands of the engravers. The same topography and hydrography, reduced to one-fifth and generalized in details, are used for the general coast charts, four of which are now in progress and advancing towards completion as the material applicable to the localities which they represent comes in.

The whole number of charts which have been engraved upon copper for publication, and which are now in use, is three hundred and eight. This is exclusive of twenty-three copperplates, containing the progress sketches, and thirty-two plates of diagrams. The number of maps, charts, and sketches lithographed in the office, in addition to the engraved ones, is one hundred and twenty-nine.

In the Drawing Division seventy-one sheets have been worked on within the year which ended on the 31st of October. In the classification which has been referred to, ten of these were maps and charts intended to be in full detail, and seventeen others of the same kind, but not connected with the coast series, their scales being various. Ten others are preliminary charts, and twenty maps and sketches for lithographic transfer. Besides twelve of the progress sketches to which additions were made, and two sheets of diagrams, thirty-five of the drawings have been completed and twenty-two are now in hand.

In the Engraving Division six first-class maps and charts have been brought to completion within the year, and supplementary work has been added to four others which had been published. Five second-class charts and sketches have also been engraved, and three diagrams for my last annual report. Twenty-eight plates are now in progress, of which thirteen were commenced within the present year. This gives a total of forty-six plates worked on, the details of eighteen of which were completed. There are, in addition to these, in the division, the plates of seven charts in various degrees of forwardness. Several of them have received all the material which the field-work has as yet furnished, and others, engraved in parts, are about to be joined and put in hand for completion.

In order to supply new maps and charts as rapidly as they were wanted for military and naval use, we, last year, established lithographic rooms in the office for ordinary lithography, engraving on stone, and transfer printing. The demand having greatly increased, all the persons attached to this branch of the office have been very closely employed. Two lithographic presses are yet kept in use. Color printing has been introduced for maps of the seat of war, and has proved very acceptable, the sale of the maps more than reimbursing the cost of their production.

Of the charts printed within the year, which have greatly exceeded in number the issue of previous years, 25,925 have been furnished to the active superintendent of the Hydrographic office of the Navy Department to be distributed to our naval vessels. Two hundred and twenty-three captains and pilots of vessels in government service, who have made application in person at the Coast Survey office, have received in the aggregate 1,863 copies of various charts. It will be seen by the report from the Miscellaneous Division, (Appendix No. 11,) that a total of 44,195 copies has been distributed during the year, of which by far the greater part were for the use of the navy and the army.

In addition to the ten memoirs descriptive of the coast, mentioned in my report of last year as lithographed and bound up with charts, and distributed to officers of the navy and of the army in command of expeditions, two other memoirs have been completed, and copies issued in like manner. Of the twelve which were prepared by the Superintendent and Assistants specially for the use of naval and military commanders, an aggregate of three hundred and eighty-five copies have been furnished since August, 1861, when the first was ready for issue. All the details in regard to the distribution of maps, charts, memoirs of the coast, &c., will be found in the Appendix before referred to.

The following list contains the titles of the maps, charts, and sketches which accompany this report. They are arranged in geographical order, as usual, and marked with numbers corresponding to the numbers in the margin of the list:

1. A.—Progress sketch, Section I, (primary triangulation.)
2. A *bis*.—Progress sketch, Section I, northern part, (secondary triangulation, topography, and hydrography.)
3. A *bis*.—Progress sketch, Section I, southern part, (secondary triangulation, topography and hydrography.)
4. Kennebec and Sheepscot rivers, Maine.
5. Portland harbor, Maine.
6. Barnstable harbor, Massachusetts.



7. Bristol harbor, Narragansett bay, Rhode Island.
8. Newport and Coasters' harbor, Narragansett bay, Rhode Island.
9. Dutch Island harbor, Narragansett bay, Rhode Island.
10. Connecticut river and New Jersey coast triangulation.
11. B.—Progress sketch, Section II.
12. Hudson river, No. 3, Poughkeepsie to Glasco.
13. C.—Progress sketch, Section III.
14. Coast chart No. IV, Cape May to Currituck.
15. Chesapeake bay, sheet No. 6.
16. Metomkin inlet, Virginia.
17. Potomac river, No. 1—entrance to Piney Point.
18. Potomac river, No. 2—Piney Point to Lower Cedar Point.
19. Potomac river, No. 3—Lower Cedar Point to Indian Head.
20. Potomac river, No. 4—Indian Head to Georgetown.
21. D.—Progress sketch, Section IV.
22. Oregon inlet, North Carolina, survey of 1862.
23. Hatteras inlet, North Carolina, survey of 1861.
24. Atlantic coast from Nantucket to Cape Hatteras.
25. E.—Progress sketch, Section V.
26. Port Royal entrance, with Beaufort, Broad, and Chechessee rivers, South Carolina.
27. Calibogue sound and Skull creek, South Carolina.
28. Ossabaw sound, Georgia.
29. Sapelo sound, Georgia.
30. St. Simon's sound and Brunswick harbor, Georgia.
31. St. Mary's river and Fernandina harbor, Florida.
32. F *bis.*—Progress sketch, Section VI, Florida keys and reef.
33. St. Augustine harbor, Florida.
34. Coast chart, No. 71, Florida reef from Newfound harbor to Boca Grande key.
35. H.—Progress sketch, Section VIII.
36. Southwest Pass, Mississippi river, 1862.
37. J.—Progress sketch, Section X, Pacific coast from San Diego to San Luis Obispo.
38. J *bis.*—Progress sketch, Section X, Pacific coast from San Luis Obispo to Bodega Head.
39. San Francisco, upper bay, California.
40. Coast from Point Pinos to Bodega Head, California.
41. Bodega bay and roadstead.
42. K.—Progress sketch, Section XI.
43. Koos bay, Oregon.
44. Gray's harbor, Oregon.
45. General progress sketch, Atlantic, Gulf, and Western coast.
46. Cotidal lines in the Gulf of Mexico.
47. Magnetic map of Pennsylvania and part of New York.
48. Diagrams illustrating discussions of magnetic horizontal force observations.
49. Diagrams illustrating experiments in length of standard bar.

NOTE.—Those of the above maps and charts which represent portions of the coast under blockade at the time of publication of this report will not appear.

#### ESTIMATES FOR THE FISCAL YEAR 1863-'64.

The estimates now submitted are intended to provide for the usual progress on the coast from Passamaquoddy to the capes of Virginia, and the progress which seems most probable from thence to the Rio Grande. They also provide for parties to aid the fleets and armies operating on the coast, in pursuance of the plan which you have fully approved, and which has, under your direction, proved so useful. Flexibility, in a work like this, is a most important feature, and that you have successfully impressed upon it. If I have erred in the estimates, it is in restricting them too much, the safest side upon which to err under the circumstances.

I suppose that one more appropriation, of about the amount now asked, will enable us to complete the survey of the Florida reefs and keys. There is now a gap in the hydrography of this dangerous part of the coast, which I expect to be able to have completed this season. It may require the application of the small appropriation for the triangulation across the peninsula, which cannot be used, under present circumstances, for completing the work for which it was designed, for this purpose. All these matters of detail will be set forth in my annual report.

The estimates include, as usual, separate items for the Atlantic and Gulf coast, Florida reefs, and western coast of the United States, without, however, the facilities formerly extended by the War and Navy Departments by the detail of officers.

ESTIMATES IN DETAIL.

For general expenses of all the sections,\* namely, rent, fuel, materials for drawing, engraving, and printing, and ruling forms, binding, transportation of instruments, maps, and charts; for miscellaneous office expenses, and for the purchase of new instruments, books, maps, and charts ..... \$19, 000

SECTION I. *Coast of Maine, New Hampshire, Massachusetts, and Rhode Island.* FIELD-WORK.—To complete the primary triangulation in this section, and to continue the astronomical and magnetic observations connected with it; to continue the triangulation of *Passamaquoddy bay*; to extend the secondary triangulation over *Machias bay, and eastward*; to complete that of *Penobscot bay* and the *Fox islands*, and to extend it over *Bluchill bay* and up the *Penobscot river*; to continue the topography of *Passamaquoddy bay*, and to complete that of *Eastport harbor, Me.*; to commence that of *Goldsborough harbor, Me.*; to continue that of the approaches to *Penobscot bay*, and to complete that of *Rockland, Rockport, and Camden harbors, Me.*; to continue that of the *Kennebec river to Augusta* and of the *Sheepscot river, Me.*, and of the *passages connecting them*; to complete that of *Cape Cod bay, Mass.*; to continue that of *Bristol Neck, Mount Hope, and Prudence and Connamicut islands and main of Narragansett bay, in R. I. and Mass.*; to continue the in and off shore hydrography of the coast of Maine, including *Passamaquoddy, Muscongus, and Penobscot bays*, and the ledges off the coast; to continue the tidal and magnetic observations at *Eastport and Portland*, and to make tidal observations in connexion with the hydrography. OFFICE-WORK.—To make the computations required by the field-work; to commence the drawing of coast chart No. 6, *Isle au Haut bay to Muscongus bay; Casco bay, Me.; Damariscotta entrance, Me.; Narragansett bay, R. I.*; to continue *Eastport harbor, Me.*; general coast chart No. I, *Quoddy Head, Me., to Cape Cod, Mass.*; coast chart No. 7, *Muscongus bay to Portland, Me.; Rockland harbor, Me.*; coast chart No. 8, *Seguin island to Kennebunkport, Me.*; coast chart No. 9, *Kennebunkport, Me., to Cape Ann, Mass.*; coast chart No. 10, *Ipswich to Green harbor, Mass.*; coast chart No. 14, *Buzzard's bay to Block island sound, R. I.; Bristol harbor and approaches*; to complete *Sheepscot and Kennebec rivers, Me.*; to commence the engraving of *Eastport harbor, Me.*; general coast chart No. I, *Quoddy Head, Me., to Cape Cod, Mass.; Damariscotta entrance, Me.; Rockland harbor, Me.; Bristol harbor and approaches, R. I.; Narragansett bay, R. I.*; to continue *Rockland harbor, Me.*; coast chart No. 7, *Muscongus bay to Portland, Me.*; coast chart No. 8, *Seguin island to Kennebunkport, Me.*; coast chart No. 9, *Kennebunkport, Me., to Cape Ann, Mass.*; coast chart No. 10, *Ipswich to Green harbor, Mass.*; coast chart No. 14, *Buzzard's bay to Block island sound, R. I.*; to complete *Sheepscot and Kennebec rivers, Me.*; and general coast chart No. II, *Cape Ann to Gay Head, Mass.*, will require ..... 61, 000

SECTION II. *Coast of Connecticut, New York, New Jersey, Pennsylvania, and part of Delaware.* FIELD-WORK.—To complete the connexion of the bases in sections I and II; to continue the triangulation of the *Connecticut river to Hartford, and of the Thames above New London to Norwich*, and the verification of the triangulation on the sea-coast of *New Jersey*, south and west of *Long Branch*; to continue the topography of the shores of *Connecticut river*; to continue that of the *Hudson*; to commence that of the sea-coast of *New Jersey*, (verification;) to continue the hydrography of the *Hudson river from Cozsackie northward*, and the verifi-

\* Viz: of all included in this item, inclusive of Sections I to IX, and exclusive of Section VI.

- cations off the coast of *New Jersey*; to make further surveys for changes in the *Delaware* at points important for defence; to continue the tidal observations in the section. OFFICE-WORK.—To make the requisite computations; to commence the drawing of *Hudson river* No. 4, *Hudson to Troy*; coast chart No. 22, *Sandy Hook to Jones river bay, N. J.*; to continue *Hudson river* No. 2, *Haverstraw to Poughkeepsie*; to complete *Hudson river* No. 3, *Poughkeepsie to Hudson*; *Hudson river* No. 1, *entrance to Haverstraw*; coast chart No. 21, *New York bay and harbor*; coast chart No. 25, *Delaware bay and river*, (new survey;) to commence the engraving of *Hudson river* No. 3, *Poughkeepsie to Hudson*; to continue that of coast chart No. 21, *New York bay and harbor*; *Hudson river* No. 2, *Haverstraw to Poughkeepsie*; to complete *Hudson river* No. 1, *entrance to Haverstraw*; and coast chart No. 25, *Delaware bay and river*, (new survey,) will require..... \$17, 500
- SECTION III. *Coast of part of Delaware and that of Maryland, and part of Virginia.* FIELD-WORK.—To continue the astronomical and magnetic observations required in the section; to examine and preserve the more important triangulation stations; to continue, if practicable, the topography of the shores of the *Potomac*; to complete the surveys of the *District of Columbia and approaches*, and, if practicable, of *James river* and the lower part of *Chesapeake bay*; and to continue the off-shore hydrography of the section; to continue the topography of the *Eastern shore of Maryland and Virginia and of the Rappahannock*. OFFICE-WORK.—To make the reductions and computations required; to continue the drawing of coast chart No. 30, *Chincoteague inlet to Great Machipongo inlet, Va.*; general coast chart No. IV, *Cape May to Currituck, Va.*; to complete *Potomac river* No. 1, *entrance to Piney Point*; *Potomac river* No. 2, *Piney Point to Lower Cedar Point*; *Potomac river* No. 3, *Lower Cedar Point to Indian Head*; and *Potomac river* No. 4, *Indian Head to Chain bridge*; to commence the engraving of coast chart No. 30 *bis*, between *Great Machipongo inlet and Cape Henry*; to continue general coast chart No. IV, *Cape May to Currituck, Va.*; to complete *Potomac river* No. 1, *entrance to Piney Point*; *Potomac river* No. 2, *Piney Point to Lower Cedar Point*; *Potomac river* No. 3, *Lower Cedar Point to Indian Head*; and *Potomac river* No. 4, *Indian Head to Chain bridge*, will require..... 13, 500
- SECTION IV. *Coast of part of Virginia and of part of North Carolina.* FIELD-WORK.—To complete, if practicable, the primary triangulation of *Pamplico sound*, and the secondary triangulation connected with it; to make the necessary magnetic observations; to commence the triangulation of the *Neuse and of the Pamplico rivers*; to complete the topography of the outer shore of *North Carolina* south of *Hatteras to Core sound*; to continue the in and off shore work of the sea-coast of *North Carolina*, and of the sounds, and the observations of tides and currents, and of the *Gulf stream*. OFFICE-WORK.—To make computations from field data; to commence the drawing of coast chart No. 44, *Cape Hatteras to Ocracoke inlet, N. C.*; to continue coast chart No. 46, *Cape Lookout to Bogue inlet, N. C.*; to complete *Oregon inlet, N. C.*; to continue the engraving of coast chart No. 37, *Cape Henry to Currituck sound, N. C.*; and complete *Oregon inlet, N. C.*, and *Beaufort harbor, N. C.*, (resurvey,) will require..... 15, 000
- SECTION V. *Coast of part of North Carolina, and that of South Carolina and Georgia.* FIELD-WORK.—To execute such work of triangulation, topography, and hydrography as may be practicable in the section, filling up the places not yet embraced in the surveys. OFFICE-WORK.—To continue the computations from field records; to commence the drawing of *Wassaw sound, Ga.*; *Doboy sound, Ga.*; *St. Catharine's sound, Ga.*; coast chart No. 57, *Sapelo sound to St. Andrew's sound, Ga.*; to continue coast chart No. 53, between *Stono inlet and Fripp's inlet, S. C.*; coast chart No. 54, *Fripp's inlet, S. C., to Ossabaw sound, Ga.*; general coast chart No. VII, *Winyah bay, S. C., to St. John's river, Fla.*; to complete *Savannah river, Ga.*, (additions;) *Port Royal sound, Beaufort and Broad rivers, S. C.*; and the chart of *Skull creek and Calibogue sound, S. C.*; to commence the engraving of *Wassaw sound, Ga.*; *Doboy sound, Ga.*; *St. Catharine's sound, Ga.*; and coast chart No. 53, between *Stono inlet and Fripp's inlet, S. C.*; coast chart No. 54, *Fripp's inlet, S. C., to Ossabaw sound, Ga.*; to complete *Savannah river, Ga.*, (additions;) *Port Royal sound, Beaufort and Broad rivers, S. C.*; and the chart of *Skull creek and Calibogue sound, S. C.*, will require..... 16, 000

SECTION VI. *Coast, keys, and reefs of Florida.*—(See estimates of appropriations for those special objects.)

SECTIONS VII, VIII, and IX. *Part of the western coast of Florida, northern coast of Florida, coasts of Alabama, Mississippi, Louisiana, and Texas.* To continue such portions of triangulation, topography, and in and off shore hydrography, as may be practicable in filling up the portions unsurveyed of these coasts, (contemplates the employment of one steamer and two sailing vessels.) OFFICE-WORK.—To make computations; to continue the drawing of coast chart No. 84, *Ocilla river to Crooked river, Fla.*; coast chart No. 88, *Choctawhatchee bay to Pensacola bay, Fla.*; general coast chart No. XIII, *Waccasassa river to Choctawhatchee river, Fla.*; general coast chart No. XIV, *Choctawhatchee river to the Mississippi delta, La.*; coast chart No. 93, *Lake Borgne to Lake Pontchartrain, La.*; coast chart No. 96, *Delta of the Mississippi, La.*; coast chart No. 100, *Point au Fer to Marsh island, La.*; to commence coast chart No. 110, *Aransas bay to Corpus Christi bay, Texas*; to continue general coast chart No. XVI, *Galveston to the Rio Grande, Texas.* To commence the engraving of coast chart No. 84, *Ocilla river to Crooked river, Fla.*; coast chart No. 85, *St. George's sound, (eastern part);* to continue coast chart No. 81, *Chassahowitzka river to Cedar Keys, Fla.*; to commence general coast chart No. XIV, *Choctawhatchee river to the Mississippi delta, La.*; to continue coast chart No. 93, *Lake Borgne and Lake Pontchartrain, La.*, will require.....

\$36, 000

Total for the Atlantic coast and Gulf of Mexico.....

178, 000

The estimates for the Florida coast, keys, and reefs, and for the western coast of the United States, are intended to provide for the following progress :

SECTION VI. *Coast, keys, and reefs of Florida.* FIELD-WORK.—To continue, if practicable, the surveys of the eastern coast of the peninsula from the present limits; to complete the triangulation and topography of the southern keys and coast of the peninsula from *Card's sound* to the work at *Cape Eable*; to complete the hydrography of the reefs, by connecting the work at *Key Rodriguez and Upper Matacumbe*, and to run off-shore lines from the reef and coast of the section; to continue the magnetic observations at *Key West.* OFFICE-WORK.—To compute results from field records; to commence the drawing of *Charlotte harbor, Fla.*; to continue general coast chart No. X, *Florida reefs and keys, Key Biscayne to Marquesas key*; coast chart No. 70, *Long key to Big Pine key, Fla.*; coast chart No. 69, *Garden key to Lower Matacumbe key.* To commence the engraving of *Charlotte harbor, Fla.*; to continue general coast chart No. X, *Florida reefs and keys, Key Biscayne to Marquesas key*; coast chart No. 70, *Long key to Big Pine key, Fla.*; coast chart No. 69, *Garden key to Lower Matacumbe key,* will require.....

\$11, 000

SECTION X. *Coast of California.* FIELD-WORK.—To continue the triangulation from the *Santa Barbara base* northward and westward towards *Point Conception*, and to complete that of the islands off *Santa Barbara channel*; to continue the triangulation from *Bodega* northward; to continue the topography in connexion with the *Santa Barbara and San Francisco* triangulations; and to extend that north from *Bodega.* To continue the hydrography off and in shore from *Point Bolsena to Point Piedras* between *Monterey and San Francisco bays*; to execute verification work off *Point Wilson in San Pablo bay*, for changes; lines of approach northward and westward from *Point Reyes, Drake's bay,* approaches to *Crescent City harbor* from westward, southward, and southwestward; to continue the tidal observations at *San Diego and San Francisco.* OFFICE-WORK.—To continue the computations and reductions of the field-work; to commence the drawing of general coast chart from *San Diego to Point Conception*; soundings off *Humboldt bay, Cal.*; to complete topography of *Tomales bay, Cal.*; sea-coast chart from *Bodega Head to Point Pinos*, including the bay of *San Francisco, 200000*; and *San Francisco bay, lower part*; to commence the engraving of general coast chart from *San Diego to Point Conception*; to continue *San Francisco bay, lower part*; sea-coast chart from *Bodega Head to Point Pinos*, including the bay of *San Francisco, 200000*; to complete topography on that of *Tomales bay, Cal.*

Also for the operations in—

SECTION XI. *Coast of Oregon and Washington Territory.* FIELD-WORK.—To complete the topography and hydrography of *Gray's harbor, Washington Territory*; to extend the topography and hydrography up *Admiralty inlet*; to continue the tidal observations required in the section. OFFICE-WORK.—To compute results; to commence the drawing of *San Juan island; Gray's harbor, W. T.*; soundings off *Cape Blanco, Oregon*; soundings off *Port Orford, Oregon; Admiralty inlet and Puget's sound*; to continue *Washington sound, W. T.*; to complete topography on that of *Koos bay, Oregon*. To commence the engraving of *Gray's harbor, W. T.; Admiralty inlet and Puget's sound*; to continue *Washington sound, W. T.*; and to complete topography on that of *Koos bay, Oregon*, will require.. \$100, 000

The other items of appropriation asked for are small; the items for the line across the Florida peninsula, and for fuel and quarters of army officers are omitted; that for the pay of engineers, according to the reduced scale of four steamers, is reinserted.

Those items are :

For publishing the observations made in the progress of the survey of the coast of the United States, by act of March 3, 1843.....	4, 000
For repairs of steamers and sailing schooners used in the survey, by act of March 2, 1853.....	4, 000
Both these items are less than those appropriated for the same objects last year.	
For pay and rations of engineers for four steamers to be used in the hydrography of the Coast Survey, and no longer supplied by the Navy Department.....	9, 000

The amounts thus estimated for the fiscal year 1863-'64, and the appropriations for the present year and 1861-'62, are given in parallel columns.

Object.	Estimates for fiscal year 1863-'64.	Estimated for fiscal year 1862-'63.	Appropriated for fiscal year 1861-'62.
For survey of the Atlantic and Gulf coasts of the United States, including compensation of civilians engaged in the work, per act of March 3, 1843.....	\$178, 000	\$178, 000	\$230, 000
For continuing the survey of the western coast of the United States, including compensation of civilians engaged in the work, per act of September 30, 1850.....	100, 000	100, 000	110, 000
For continuing the survey of the Florida reefs and keys, including compensation of civilians engaged in the work, per act of March 3, 1849.....	11, 000	11, 000	25, 000
For completing the line to connect the triangulation on the Atlantic coast with that on the Gulf of Mexico, across the Florida peninsula, including compensation of civilians engaged in the work, per act of March 3, 1843.....	.....	.....	5, 000
For publishing the observations made in the progress of the survey of the coast of the United States, including compensation of civilians engaged in the work, per act of March 3, 1843.....	4, 000	5, 000	5, 000
For repairs of steamers and sailing schooners used in the survey, per act of March 2, 1853.....	4, 000	5, 000	10, 000
For fuel and quarters, and for mileage or transportation, for officers or enlisted soldiers of the army serving in the Coast Survey, in cases no longer provided for by the quartermaster's department, per act of August 31, 1852.....	.....	.....	25, 000
For pay and rations of engineers for seven steamers used in the hydrography of the Coast Survey, no longer supplied by the Navy Department.....	†9, 000	.....	†12, 800
Total.....	306, 000	299, 000	402, 800

\* Formerly included in estimates of War Department.

† Formerly included in estimates of Navy Department.

The amount of these estimates is but about six per cent. more than half those of 1861-'62, as shown by the comparative table. All the items are either the same as, or less than, those appropriated last year, except the one for the pay of engineers for the steam vessels, which was omitted last year, as there was a sufficient surplus, from the reduction of the previous year in the number of steamers, to last until the close of the year 1862-'63.

## DEVELOPMENTS AND DISCOVERIES.

The general list of developments and discoveries, containing the items arranged in geographical order, is given in Appendix No. 4. Those connected with the work of the present year are here appended, and will hereafter take their places in the general list.

The difficulty of finding rocks, of which we have had so many instances, cannot be better illustrated than by the fact that two should have been discovered in and near the entrance of so well surveyed and so well known a harbor as that of Newport. The particulars in regard to position, &c., of these, which stand first in the appended list, are stated in Appendix No. 6.

For the notice given in Appendix No. 7, in reference to a shoal spot supposed to exist to the eastward of the Winter Quarter shoal, (coast of Maryland,) I am indebted to G. W. Blunt, esq., of New York city.

1. Two rocks discovered in the approaches to Newport harbor, R. I; one with fourteen and a quarter feet of water on it at mean low tide, the other with seventeen feet at mean low water. Ten other rocks in the vicinity (previously known) were determined in position.

2. The shifting of the bar of Metomkin inlet, Va., and changes of shore-line, but without alteration of depth on the bar.

3. Determination, by close soundings, of the best line of water for crossing the Kettlebottom shoals, Potomac river, there being no well defined channel over the shoals.

4. Changes in depth and outline at Oregon inlet, N. C.

5. Special examination of the tides and currents, with reference to the hydrographic and shore-line changes at Hatteras inlet, N. C.

6. Development of the alteration in outline and depth at the entrance of Beaufort harbor, N. C.

7. Re-examination, by soundings, of the Rattlesnake shoal, coast of South Carolina.

8. Stono entrance, S. C., sounded, and channel found half a mile to westward of its former position, with slight increase of depth.

9. The shoaling of North Edisto entrance from its former depth, giving now only nine feet of water.

10. St. Helena entrance, S. C., examined, and a new channel from the eastward found, giving sixteen feet at mean low water.

11. The south channel of Port Royal sound developed, and nineteen and a half feet found to be the least depth in it.

12. The channel of the inland passage thoroughly sounded, leading from Port Royal sound into Tybee roads, through Skull creek and Calibogue sound.

• 13. The bar and entrance of St. Simon's sound, Ga., examined, showing no material change of depth within the past two years.

14. The shifting to southward, and shoaling by several feet, of the channel into Fernandina harbor, Fla., having now only eleven feet at mean low water.

15. The further encroachment of the sand spit at the confluence of Karquines and Marc Island straits, upon the channels which branch towards the navy yard and Benicia.

## SPECIAL SURVEYS.

The maps and charts for the United States commissioners on the harbor of Boston, called for by the city in the study of means for the preservation of the harbor, have made good progress in Mr. Boschke's hands, and it is expected will be finished soon after the opening of the new year.

Special surveys of the shore-line of Prudence Island, of Taylor's cove, Connanicut, Dyer's Island harbor, and of Dutch Island harbor, in Narragansett bay, were promptly made for the navy yard commission by Assistants A. M. Harrison and Henry Mitchell and their parties, and the maps needed for the use of the commission were rapidly drawn and furnished. A special survey, also, of Coasters' Harbor island and of the adjacent shore was made by Assistant Henry L. Whiting, and the drawing promptly returned. This is on a large scale, and upon it the study of the suitability of the island as a site for the Naval Academy may readily be made. Mention of these surveys will be found under the head of Section I.

The levellings required by the navy yard commission at League island, and Red Bank, opposite to it, in New Jersey, were made by Assistant George Davidson, and notice of his work in that vicinity will be given under Section II.

One of the naval officers, who has in former years served acceptably in the work of the Coast Survey—Lieut. Commander D. L. Braine, U. S. N.—addressed me, last summer, offering, if means were supplied from the office, to determine the condition and capacity of the western channel at the Cape Fear entrance. This was to be incidental to his duties in command of the U. S. steamer *Monticello*, then, as now, in service on the blockade of the coast of North Carolina. After consulting the Navy Department, the instruments and projection needed were furnished, and the promise of Lieut. Commander Braine as promptly fulfilled. In the channel over the bar of the western entrance he found some improvement in depth. This channel had but nine feet at mean low water in 1856. In reference to the examination which he made in September of the present year, Lieut. Commander Braine states that he "is led to believe that there is a depth of fifteen feet at high water, which would give in the channel ten and a half feet at mean low water."

This survey was, of course, made under many disadvantages, and will be further pushed by the commander of the *Monticello* as opportunity occurs. Its difficulty and danger are apparent from the fact that the soundings were made at night, and almost immediately under the guns of the enemy's batteries. In allusion to this, it is remarked in the report that "the sentry's hail on his post could be distinctly heard on the deck of the *Monticello*."

On hearing of the raid into Pennsylvania, in October last, I volunteered the services of Coast Survey officers (the Secretary of the Treasury approving) for any military reconnaissances which might be desired, and for making the maps which I thought might be desirable. The presence of Assistant George Davidson near the city of Philadelphia would have rendered immediate service practicable. This offer was communicated to the committee of councils on defence by the mayor, Alexander Henry, esq.

#### TIDE TABLES FOR MARINERS—TIDES AND CURRENTS.

An edition of the tide tables, revised by Assistant L. F. Pourtales, is printed in Appendix No. 8. In it a few errors which had heretofore escaped detection have been corrected.

The tidal stations, with two exceptions on the Atlantic coast, and all those upon the Western coast, have been kept up; but it has been necessary to abandon, for the present, those on the Gulf of Mexico. The self-registering gauge left by Mr. Donegan at New Orleans, in the summer of 1861, has been recovered; that at Fernandina, Fla., is believed to have been destroyed by the rebels. The one which was formerly used near Pensacola was, in all probability, destroyed by the burning of the navy yard. Nothing has yet been heard of the self-registering gauge which was on board of the schooner *Twilight* at the time of her seizure at Aransas.

#### TABLE OF DEPTHS.

The table containing a statement of the depth of water at the entrances of all the considerable harbors and inlets of the United States, which was published in my annual report for 1859, has been revised in the Hydrographic Division of the office, and will be found in Appendix No. 5. The table contains several entries which were not given at the previous date.

#### INFORMATION FURNISHED.

The information furnished under authority of the Treasury Department during the past year is stated in the form of a list, in Appendix No. 2, to which are also added the tracings from the original sheets needed by the military and naval officers in command of expeditions. The list does not contain a large amount of information communicated for their use by other modes, as the compilation of geographical data for parts of the coast not regularly surveyed, and the preparation and distribution of special notes and photographs of special surveys.

Great care has been taken to discriminate in regard to the applications for tracings, &c., for the purposes of civil life.

#### STATISTICS.

The table of statistics has been added to, so as to bring it up to the present surveying year, and is given in Appendix No. 3.

Up to 1861, inclusive, the triangulation had embraced an area of nearly fifty-four thousand two hundred square miles, within an area of nearly sixty-two thousand square miles covered by reconnaissance; and had

developed a general extent of coast of over four thousand five hundred miles, and a shore-line of about twenty-three thousand miles, determining nine thousand four hundred and fifty-two geographical positions.

For longitude determinations, eighty-five stations had been occupied; for latitude, one hundred and twenty-seven, and for azimuth, eighty-four stations.

The topography had extended over an area of nearly seventeen thousand square miles, having a general coast line of four thousand miles, and over forty-two thousand two hundred miles of shore-line, measuring the indentations.

The hydrography extended over an area estimated at forty-six thousand square miles, in which one hundred and ninety-six thousand miles were run in sounding; six million three hundred and ninety-eight thousand soundings were made, and over eight thousand four hundred specimens of the bottom obtained.

The number of manuscript maps and charts constructed was two thousand one hundred and eighty-one, and of engraved maps, charts, and sketches there had been produced four hundred and ninety-three plates.

#### DISTRIBUTION OF ANNUAL REPORTS AND MAPS.

It has been judged expedient during the past year to hold still in abeyance the usual foreign distribution of the printed annual reports through the Smithsonian Institution, as was done during the year which ended with October, 1861, as was stated in my last annual report.

During the past year 4,028 copies of reports of various years have been distributed to institutions and individuals in the loyal States of the Union, leaving on hand a limited number of copies for the years from 1851 to 1860, inclusive. Of those remaining on the 1st of November there were of the report for 1851 two hundred and twenty copies; of that for 1855, four hundred and twenty copies, and of that for 1857, three hundred and twenty-eight copies left. Of the dates 1853, 1856, 1859, and 1860, the copies disposable for general distribution is larger. This decidedly unequal number of copies of the reports of various back years makes it necessary to discriminate carefully in their issue. It is also to be remembered that for the years 1859 and 1860 no copies have been sent to the States which now disavow their allegiance to the government of the Union, but which will at some future day feel interested, in common with the others, in the information which they embody. To provide for the best issue of these remaining reports (1851 to 1860) a circular has been sent to the principal libraries in the more important cities of the north, and to those of universities, colleges, and other institutions, to ascertain what reports may be needed in order to complete their series, so that entire sets may in future be within reach for purposes of reference in all the States to which they are now sent.

As already stated under the head of maps and charts, upwards of forty-four thousand copies of printed maps, charts, and sketches have been sent from the office since the date of my last report—a number more than double the distribution in the year 1861, and upwards of five times the average annual distribution of former years. This large and increasing issue of charts within the past two years has been due to the constant demands of the Navy and War Departments, every effort to supply which still continues to be made.

Besides the printing of charts by the transfer process, the production of the hydrographic memoirs of the coast with facility offers further proof of the advantage of establishing a lithographic division at the office, though induced as it was by the emergency of last year for copies of charts. The course taken in the preparation of the hydrographic notes was mentioned in my report of last year, and has also been alluded to in this, under the head of maps and charts. The testimonials from the different commanding officers as to their value have been numerous and emphatic.

A summary of the details of distribution of the annual reports, maps, charts, &c., is contained in the report from the miscellaneous division of the office, Appendix No. 11.

#### RECORDS AND RESULTS.

I call attention again to the fact that this publication is postponed for more auspicious times, as I have repeated applications for copies. The present appropriation merely enables us to prepare the materials for publication, but not to publish.

#### LONGITUDES.

The history of the determination of longitudes in connexion with the survey of the coast, from the law and plan of reorganization of 1844 to 1858, was given in my report for 1858, including the methods by astronomical observations, by the transportation of chronometers, and by the electrical telegraph. The



problem of longitudes by occultations of the Pleiades is described in the appendix of my report for 1856. Professor Peirce has been engaged since 1854 in stimulating observers to a new series of observations, by preparing predictions and charts of the occultations, as explained in my report for the year 1858. These observations were collected during the period from 1857 to 1861, or until the moon's path ceased to pass among those stars. While this new series of observations was in progress with modern instruments and methods, Professor Peirce was occupied in recomputing the older series, for the period 1838 to 1842, by the aid of the new lunar tables. The results are given in his report, which was printed as Appendix No. 17 in my report of last year. "The conformity of the observations with theory is quite remarkable, and shows that this, the most delicate of all the observations of the moon, demands and justifies the utmost precision of calculation. The final determination of the longitude will, undoubtedly, surpass all others in precision."

Some of the particulars of this interesting series of results are stated in the professor's report, Appendix No. 12. Certain of the occultations which were observed both in Europe and America will serve to determine the errors of the tables, and hence to compute with suitable corrections those which were observed only in America, and to obtain a second determination of the longitude. Professor Peirce remarks that "the various observations will also serve the subsidiary purpose of determining the relative longitudes of the different places which are upon the same continent either of Europe or America, and also to correct the places of the stars, and, finally, to determine the value of the lunar semi-diameter, and the necessity of having regard to the protuberances of the moon in the complete solution of the problem."

Professor Peirce has addressed to me a special letter in relation to the tables of the moon used in the reduction of the observations of the Pleiades, (Appendix No. 13.) The Professor gives his reasons for using Hansen's tables in the computations, and, referring to the "full and generous" statements of Mr. Lubbock, in the thirtieth volume of the Memoirs of the Royal Astronomical Society, in praise of the American tables prepared by Professor Peirce for the Nautical Almanac under the direction of Captain Davis, U. S. N., corrects some historical statements in reference to the labors of mathematicians who have been occupied with the important task of improving the lunar tables.

The observations made by telegraph for the difference of longitude between Macon, Ga., and Eufaula, Ala., in the working season of 1859-'60, have been discussed by Dr. B. A. Gould. He reports that the difference in time between the astronomical stations is, Eufaula 6*m.* 3.02*s.* west of Macon; which result, he adds, cannot be erroneous by more than five-hundredths of a second of time.

The detailed report on the results of the observations made in Georgia and Alabama is in course of preparation. I have placed in the Appendix No. 14 Dr. Gould's report on the progress which has been made in computing the results for all the stations between Calais and New Orleans.

#### MAGNETISM.

The publication of the results of a discussion of the Girard College observations, from the Smithsonian Contributions to Knowledge, commenced in my reports of 1859 and 1860, is continued in this, embracing the discussion of the observations of horizontal magnetic force. The difficulty which stands at the threshold of the discussion of these observations is the correction for temperature, the magnetic bars changing in their own intensity of force with changes of temperature. The attempts to obtain the value of this correction are fully stated, and their application is shown and verified in various ways, in Part IV of the memoir, (Appendix No. 15.) Tables of the results, reduced to a standard temperature of 63° Fahrenheit, are then obtained, and corrected for the progressive change in the readings of the magnets. The observations are next separated into regular and disturbed readings by the aid of Peirce's criterion, and the disturbances being taken out, there remain the normal results for the hour, day, and year. These show the same period of ten or eleven years in number and extent of disturbances which was deduced from the declination observations, corresponding with the period of change in the solar spots. The results agree very well with those obtained at Toronto, Canada. The curves of daily change of horizontal force come out very perfectly in each year's result, the curves showing two maxima and two minima in the course of the day, and the day changes being much more considerable than those of the night.

The next part of the memoir, Part V, (Appendix No. 16,) contains the investigation of the diurnal and annual variations of the horizontal magnetic force, from the means of the results for the five years of observation. The normal value of the horizontal intensity for the several hours of the day and months of the year of the five years is deduced, applying all the required corrections. The summer and winter results are compared in formulæ, and by curves, with the mean for the whole year. At 6 a. m. there is scarcely any change

horizontal force throughout the year, and at 11½ a. m. it is also nearly constant. Two other points of the same sort occur at 7½ p. m. and at 11 p. m.

From this discussion results a series of curves (Sketch No. 48) which show the horizontal force at every hour of the day of every month of the year. These correspond to the curves of declination referred to in my report of 1860. Both have been beautifully represented, by modelling, by Mr. F. Engel, of the Coast Survey office.

Part VI of the memoir (Appendix No. 17) shows the influence of the moon on the magnetic horizontal force. The magnetic tide, so to speak, has two ebbs and flows in the lunar day. The times of maxima are two hours, and of the minima seven and a half hours after the culminations. The influence of the relative positions of the sun and moon on the horizontal magnetic force, though small, is distinctly perceptible, and the same is true of the moon's declination changes. When the moon is nearest the earth the horizontal magnetic force is decidedly lessened, and when at the greatest distance from the earth is increased.

At Eastport, Me., the magnetic observations intended chiefly to furnish results bearing on the study of the secular change have been continued. Besides the change of the three magnetic components, these observations will also give the means of tracing the connexion of the diurnal range of the declination with the relative frequency of solar spots, and furnish, in addition, standard annual means for the general discussion of magnetic observations which have been made along the entire northeastern coast of the United States.

At Key West the observations, both differential and absolute, have been continued, and the former now present an unbroken series of daily records. The photographic records of the three elements are revised regularly at the office, and have been tabulated with a view to their general discussion in a form somewhat similar to that used in the treatment of the Girard College series, of which mention has been already made. Though strictly scientific in character, these investigations will give ready means for tracing the secular changes that are now going on in the eastern part of the Gulf of Mexico.

In the years 1840 and 1841 I made a detailed magnetic survey of the State of Pennsylvania and of adjacent parts of New York, Ohio, and Maryland, to which other observations were added in 1843, while on a tour through Western New York, Canada, New Jersey, and Pennsylvania. These observations have recently been worked up and prepared for the press, having been made with the best instruments then available. An abstract of the discussion of them is given in Appendix No. 19. The declination was determined at sixteen stations, and the dip and intensity at forty-eight.

In July and August, 1862, six of the stations in my series were reoccupied by Assistant Charles A. Schott, (Appendix No. 18.) The expense incurred for the three which fell outside of the limits of Coast Survey operations was defrayed by the Smithsonian Institution, and this co-operation has added greatly to the expected value of the results. This is believed to be one of the earliest systematic surveys, that includes the three magnetic elements, as yet made in any of the States. Its object is intimately connected with an important part of the operations of the Coast Survey. In Appendix No. 19 I give an abstract of the individual results, as well as a general account of the discussion and of the expressions deduced for the distribution of magnetism over the area surveyed. The subject is further illustrated by Sketch No. 47, which shows the isomagnetic curves for the epochs 1842 and 1862.

The regular biennial publication of results found for the magnetic declination, dip, and intensity, at stations which have been occupied by Coast Survey parties within the last two years, is contained in Appendix No. 20. This comprises twenty-two stations, numbered in continuation of those given in Appendix No. 28 of my annual report for 1860.

#### SOLAR SPOTS.

The record of solar spots which was kept at the Coast Survey office by Assistant Schott with considerable regularity until the close of the year 1861 has since been only partially kept up, in consequence of the pressure of routine duties. Appendix No. 21 gives a continuation of the records which were published in 1860 and 1861 as Appendix No. 25 in my reports for those years. European observations, made regularly and published every year, will supply the place of the omitted records in the discussion of magnetic observations.

#### EARTHQUAKE WAVES.

The renewed interest awakened on this subject by the presence in our country of Captain Lessoffsky, of the Russian navy, who was in command of the flag-ship *Diana*, Admiral Pontiatine, wrecked by the effects of the earthquake of December 23, 1854, in the harbor of Simoda, Japan, has called my attention to errors,

some of them typographical, in the printing of my paper on earthquake waves, and the depth of the ocean as deduced therefrom, in the Coast Survey report for 1855. As the best mode of correction, I have included the paper for reprint with the appendix matter of this report. It will be found in the Appendix, No. 24.

#### FLORIDA REEF.

Captain E. B. Hunt, of the corps of engineers, has contributed for this report an interesting paper on the origin, growth, substructure, and chronology of the Florida reef, which will be found in the Appendix, No. 25. Its conclusions will meet with examination and criticism from those who have been occupied in these and similar studies. The practical part referring to soundings, currents, winds, &c., is of decided interest to navigators.

#### HEIGHTS.

The collection of data, from all available sources, for heights over the continent of North America has been continued during the past year; and the preparation of a map to form a basis for the projection of contour lines has been carried on as far as the time of the Assistant charged with this subject would allow from other pressing calls.

This collection of heights has been placed at the disposal of the chief topographical engineer of the army of Washington.

#### EXPERIMENTAL INQUIRIES.

The experiments for determining the length and expansion by heat of the standard bar, referred to in my report for 1860 as being in progress, were completed early in 1861, under the direction of Assistant J. E. Hilgard, by Mr. W. L. Nicholson, aided by Mr. J. R. Gilliss and Mr. Thomas McDonnell; but, owing to the pressure of business in the office, a complete discussion of results was not made until the present year. An abstract of the experiments and results is given in Appendix No. 26, from which it will appear that complete success has attended these delicate operations.

A special mode of construction of the axle of the magnetic dipping-needle, admitting of its being turned in its arbor, in order that observations may be made with the needle resting upon different parts of the pivots, has been devised and put in practice by Assistant Hilgard. A description of the new arrangement and an abstract of experiments are given in Appendix No. 23.

In my last report a comparison of the relative change by atmospheric moisture in the dimensions of maps drawn on "parchment" paper and on drawing paper backed with muslin was stated to have resulted in favor of the latter. Specimens of an improved quality of parchment paper having been submitted, similar comparisons were again made, but with a like result, as will be seen by reference to Appendix No. 27.

#### AIDS TO NAVIGATION.

The lists which have appeared in my previous annual reports, giving the recommendations of the Assistants of the Coast Survey for aids to navigation in special localities in which the need for them was open to observation, are this year almost entirely represented by one, (Appendix No. 36,) showing the number of buoys set by the working parties at the port and harbor entrances of the southern States for the use of the blockading squadrons. All of the sailing marks seem to have been taken up and destroyed or secreted early in 1861. In some cases the buoys belonging to a channel were found at the nearest town, but in other instances new ones were required. They were all replaced with reference to the hydrographic changes which have occurred since they were first put in place.

#### DIRECTORY OF THE PACIFIC COAST.

I have availed myself of the convenient access which Assistant George Davidson at present has to the office, having returned two years since from the Western coast, to invite him to prepare a second edition of the Directory of the Pacific coast, which was published in my annual report for 1858. It is to be understood that this embodies the information collected in our archives by the labors of the Assistants in the Coast Survey since 1849, as well as the researches into historical and other matter by the author, and his personal experience and observation. Thus are embraced the astronomical determinations of Assistants R. D. Cutts and George Davidson, and Sub-Assistant J. S. Lawson; those from triangulation by Assistants Cutts, Davidson, Rodgers, Greenwell, and Lawson; the topographical by Assistants Cutts, Harrison, Rodgers, and Johnson; and the hydrographic by Lieut. Com'g W. P. McArthur, the pioneer of the hydrography; by

Lieut. W. A. Bartlett; by Captain James Alden, the able commander for nine years of the well-named surveying steamer *Active*; by Lieut. R. M. Cuyler; and by Captain B. F. Sands.

The directory, as revised and extended by Assistant Davidson, is given as Appendix No. 39.

## OFFICERS OF THE ARMY AND NAVY.

The very acceptable aid which we have in former years received from the officers of the army and navy, and which was returned to the government by the experience acquired in the various operations of the survey, has necessarily been withdrawn from us, the war placing us in the position of giving aid instead of receiving it. Lieutenant Commander Phelps is at this time the only officer of the navy left with us, and we have not a single army officer on full duty with us. Captain Elliot, of the corps of engineers, is still, however, permitted to examine and send to us the tidal observations from the Western coast.

## OBITUARIES.

Assistant Alexander S. Wadsworth died, suddenly, in the city of Washington, on the 9th of August, 1862. He joined the survey in 1848, and, opportunity and his merit concurring, rapidly rose to the position of Assistant, which he occupied at the time of his death. His triangulation and plane-table work on the coast of North Carolina were among the most rapid and successful works of their class.

Sub-Assistant Wyllys S. Gilbert, of Zanesville, Ohio, died of pulmonary disease on the 12th of January, 1862, at Wakatomaka, within a few miles of his home. He was an excellent topographer, having been trained carefully by his accomplished brother, Assistant Samuel A. Gilbert, (acting brigadier general, second brigade, second division, army of Kentucky.) Although but little exposed to the rigors of a northern climate, Sub-Assistant Gilbert contracted, a few years ago, the disease of which he died; and notwithstanding efforts made to save him by assigning continuous service in the southwest, his strength gradually wasted, and he was added to the victims in our corps, of consumption of the lungs.

General Isaac I. Stevens had so thoroughly identified himself with the Coast Survey, during his four years of service as Assistant in charge of the office, that those with whom he had zealously and ably served could not suffer his death, upon the field of Chantilly, to pass unmarked by the deepest tokens of their respect and regret, and met to give expression to their feelings towards their former associate and chief, and of condolence with his bereaved family, in the resolutions and remarks which are given in the Appendix, No. 40.

Major William R. Palmer, U. S. topographical engineers, brevet lieutenant colonel U. S. army, remained on service in the Coast Survey while aid to Major General McClellan, until the army moved forward into Virginia last spring, when it was necessary to accompany the general's staff. The same zeal which made him so serviceable in the office displayed itself in the field; and the hardships of the Peninsular campaign, acting upon a somewhat delicate constitution, laid him open to the attack of typhoid fever of which he died, on the 18th of June. He was able to return home to the care of his devoted wife, but so much enfeebled by disease as not to rally, and on the day after his arrival in Washington he breathed his last, mourned by a large family circle to whom he had been always deeply attached, and regretted by numerous friends who had shared his hospitality and good offices. The officers of the Coast Survey expressed their regret in the resolutions given in Appendix No. 40. My own relations to Major Palmer were such as are due to a proved, true, and life-long friend.

Captain John R. Smead had left the Coast Survey office, on the breaking out of the war, to command the Washington Rifles, and after the campaign, in which they were so much distinguished for discipline and readiness of service, had returned to his position in the fifth regiment of U. S. artillery. He perished in the bloody fight near Manassas, on Saturday, August 30, leaving a young and helpless family to the care of his country, for which he had laid down his life. The Appendix already referred to contains the resolution passed by his recent associates in the office on the occasion of his death.

Brigadier General William R. Terrill, of Virginia, was in charge of a Coast Survey party on the western coast of the peninsula of Florida when the rebellion broke out. He promptly disentangled his party and the government property from the hands of the rebels, when seizure became imminent, and, returning north, ranged himself unflinchingly on the side of the whole country, seeking at once service of the most active kind with the army. By nature morally, as he was also physically, dauntless, he resisted every effort of his relatives who sided with the State of Virginia, and declared himself a soldier of the Union. After service in drilling the earlier companies that arrived in Washington, he joined his regiment, (fifth regiment of artillery,) having been promoted to a captaincy. His marked intrepidity in the battle near Pittsburg Landing, in Tennessee, and before Corinth, in Mississippi, won for him a commission as brigadier general of volunteers.

In the summer campaign he was in service with the army of Kentucky, under General Buell, and was mortally wounded in the battle which was fought at Berryville on the 8th of October. The genial memories which his name would have elicited at all times amongst his former associates in the work of the survey are turned to sadness by the early death of this truly upright and patriotic officer.

By an accident at the Mare Island navy yard, on the night of April 2, which caused the death, by drowning, of William F. Sands, the survey has lost the only hydrographic aid then attached to the work. His naturally good abilities had been developed to a promise of great usefulness by his father, Commander B. F. Sands, U. S. N., with whom the deceased had served from early boyhood in the practical details of hydrography. Remarkable for an amiable and teachable disposition, he had gained proficiency in hydrographic drawing, and was fully qualified to make return for the high expectations which had been formed in his training. At the time of his death Mr. Sands was acting master in the hydrographic party, and was engaged in the prosecution of the survey in Section X.