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No. 87.

REPORT

OF THE

SUPERINTENDENT

OF THE

UNITED STATES COAST SURVEY,

SHOWING

THE PROGRESS OF THE SURVEY

DURING

THE YEAR 1866.

TEXAS TECHNOLOGICAL

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COLLEGE

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"Along the western side the bottom is rocky and very uneven, and entirely unfitted for anchorage with such distance as might afford protection from southerly winds or seas. More than a quarter of a mile seaward of the middle of the island I found a small rock with only thirteen feet of water on it, the depth alongside being four and a half fathoms, and a little to the northward of it another with eighteen feet water. Off the southern end was found a rock having sixteen feet water, in a position less than two hundred metres from the outer reef of the ledge. No other dangers were discovered outside of the three ledges that make off like fingers.

"The eastern side of Destruction island affords the only proper anchorage, but, if resorted to, vessels must put to sea at the first indication of a southerly wind. As an anchorage, it is safe only during northerly or northwest winds. From a half to three-quarters of a mile off, the soundings are quite regular in from ten to twelve fathoms with hard bottom, but in-shore the bottom is broken, though not so much as elsewhere. In places the wall of rock is so bold at low-water mark that vessels might moor but for the sea swell."

In connection with the survey of the island, the shore-line of the main land of Washington Territory, in the vicinity, was traced for several miles, and a few lines of soundings were run between the island and the main. The results are given in a sketch (No. 23) accompanying this report. Eleven hundred soundings were recorded in the progress of the survey.

Tidal observations.—The tidal station at Astoria has been, as heretofore, in charge of Mr. L. Wilson, under the general direction of Captain G. H. Elliot, United States engineers. The meteorological observations at this station have also been recorded by Mr. Wilson with the usual care and completeness.

Besides the station in Oregon, Captain Elliot has directed the observers employed at the two stations on the coast of California, already mentioned under the head of Section X.

COAST SURVEY OFFICE.

In the several divisions of the office in Washington the duties allotted to each have been performed with but slight change in the arrangements previously made for the service. As stated in former reports, data and material received from the field, admitting of classification, are appropriately referred, and after being worked up are subsequently conjoined under the direction of the assistant in charge for the intended publications. The divisions are designated as follows:

Hydrographic Division, in which, under the direction of Captain C. P. Patterson, hydrographic inspector, all the adjuncts required for the final issue of charts are prepared and arranged, as the inspection and verification of original matter, selection of characteristic soundings, designation of dangers to navigation, sailing lines, and sailing directions. During the year but one draughtsman, Mr. E. Willenbacher, has been attached to the division.

The equipment and care of vessels, and their readiness for service with the surveying parties, are amongst the duties devolving upon the hydrographic inspector.

Tidal Division.—The tidal data previously collected in this division, and retained in the charge of Assistant L. F. Pourtales, have been digested within the present year into the form of tables showing the tides for every day of the year 1867, at ports on the Atlantic, Gulf, and Pacific coasts of the United States. An edition printed and bound in convenient form has been furnished for the use of the naval and revenue service. Mr. R. S. Avery was in charge of the division during the latter part of the year, in the temporary absence of Assistant Pourtales, and much credit is due to him for the good judgment and energy manifested, particularly in the preparation of the manuscript of the tide-tables for publication.

The observations pertaining to this division, maintained at regular stations on the coast, are reported under the sections to which the stations severally belong.

In office details Assistant Pourtales has been aided also by J. Downes, J. Sprandell, D. Schooley, M. Thomas, and F. R. Pendleton.

A specimen showing the arrangement of the tidal ephemeris for 1867, applicable to the port of Eastport, is given in the Appendix, (No. 7.) For the use of the merchant marine an edition of the tables has been provided for sale at the principal ports.

Computing Division.—The charge of this division has been continued with Assistant Charles A. Schott, whose personal attention has been given to the refined computations connected with the adjustments of the primary triangulation of the coast, and to other special processes required in

the deduction of results from extended series of observations. Amongst these was the establishment of final equations, derived from occultations of the Pleiades for the verification of longitude and for correcting the lunar elements, a work prosecuted under the general direction of Professor Benjamin Peirce, of Harvard.

The routine work, such as office adjustments of the observations made by triangulation parties, reductions required in determining latitude, longitude, azimuth, and the magnetic elements, has been kept up, each part when completed being made the subject of a special report by the chief of the Computing Division.

The computers attached to the office are Messrs. T. W. Werner, Eugene Nulty, G. Rumpf, and E. H. Courtenay. Mr. R. S. Avery was on duty in the division until May, and Messrs. J. G. Spaulding and F. H. Agnew for limited periods previous to their assignment to field service.

Drawing Division.—This branch of the service, as during several years past, has remained under the immediate supervision of the assistant in charge of the office. Mr. W. T. Bright, as heretofore, has aided in conducting the office details connected with the division.

The names of the draughtsmen, their employ, and the titles of the drawings on which they have worked during the year, specified as completed or yet in progress, will be found in tabular form in the Appendix, (No. 3.)

Engraving Division.—Under the immediate direction of the assistant in charge of the office, the supervision of work in this division has been continued in the care of Mr. Edward Wharton.

The pantagraph has been used with effect during the year in engraving directly on copper at the proper scale, from the outlines of tracings taken from the original sheets; and punches have been further employed for making the figures to express soundings on charts of the second class.

A synopsis of the operations of the division, including the names of the engravers, is given in the Appendix, (No. 4.)

The clerical duty was performed by Mr. George C. Schaeffer, jr., until August, when he was assigned to duty in the field.

Electrotype and Photographing Division.—By the electrotype process thirty-two of the most recently engraved plates have been duplicated within the present year by Mr. George Mathiot. For use in the Engraving Division fifteen photographic glass positives and thirty-four glass negatives were made, as reductions from original sheets of the survey. In duplicating maps intended for the engraver, and for other purposes, 184 paper prints have been made by the photographic process. Mr. A. F. Pearl aided in the duties of this division until July, when he was attached to a field party.

Lithographing.—Within the year the reconnaissance sheets of the Mississippi river between Cairo and St. Mary's, six in number, have been engraved by Mr. C. G. Krebs, as also nine of the sheets representing the reconnaissance of the Tennessee, and four diagrams. The services of Mr. Krebs have also been in requisition for the preparation of charts issued in colors, and for miscellaneous engraving, as notes and titles of preliminary charts of which only the shore-line and soundings had been engraved on copper. The details of work in this division, as also the chart and map printing, have been directed by Mr. W. W. Cooper.

Chart and map printing.—On the copper-plate press 15,820 copies of charts and sketches have been printed in the course of the year ending on the 1st of November. With the lithographic press 5,150 copies have been printed by transfer, of which number about one-third were printed in colors. Early in the year that press was used for final editions of special maps which had been engraved on stone and issued during the war; and of this class 7,922 copies were printed. Exclusive of circulars about 21,000 impressions were printed on the lithographic press during the year. The copper-plate press has been worked by Mr. T. V. Durham, the lithographic press by Mr. A. Brown.

Distribution of maps and annual reports.—An aggregate of 10,900 copies of charts have been distributed within the year. The map-room was in the charge of Mr. M. T. Johnstone until a short time before his death, which took place in June. The duties pertaining to it are now performed by Mr. Thomas McDonnell. Of 5,000 copies of annual reports for various years, distributed within the last twelve months, about one-fifth of the number was forwarded to institutions.

limited to the determination of points to serve for tracing the shore-lines, and for hydrographic signals. Mr. Gerdes identified two of the stations which he had previously occupied, and from them extended the triangulation by observing at seven new stations. He was aided in the field by Sub-Assistant C. H. Boyd, and by Messrs. L. A. Sengteller and H. G. Ogden.

SECTION IX.

FROM VERMILION BAY TO THE RIO GRANDE BOUNDARY, INCLUDING PART OF THE COAST OF LOUISIANA AND THE COAST OF TEXAS. (Sketch No. 19.)

Hydrography of Matagorda bay, Texas.—An interval in the hydrography between the entrance and the port of Matagorda was filled in by the party of Assistant F. P. Webber, in July. For this service the schooner Stevens was assigned, and continued in the work until the 1st of August, when the vessel was laid up at Indianola. Eight thousand soundings were recorded.

Assistant Webber was aided in the hydrography by Messrs. H. Anderson and F. D. Granger.

During the latter part of the season all the members of this party were on duty in other sections of the coast.

Topography of Corpus Christi bay, Texas.—The regular topographical survey of the coast of Texas was resumed at Aransas Pass on the 18th of June, by Sub-Assistant Charles Hosmer, with a party in the schooner Peirce. Owing to the damage received in her very stormy passage, the vessel was found to be unavailable for the usual service in moving from place to place as the plane-table work advanced. Signals were however set up and other preliminaries arranged for the successful prosecution of the work. After tracing twenty-four miles of shore-line at the northern end of Corpus Christi bay, the condition of the schooner required that she should be sent to Mobile for repairs. Seven square miles of topographical area were mapped before closing work at the end of July.

Sub-Assistant Hosmer was aided in this section by Mr. A. L. Ross.

SECTION X.

COAST OF CALIFORNIA FROM THE SOUTHERN BOUNDARY OF THE UNITED STATES ON THE PACIFIC TO THE FORTY-SECOND PARALLEL. (Sketch No. 21.)

Topography between Point San Pedro and Pillar Point, California.—The coast topography between San Francisco entrance and Monterey bay has been completed by the addition of an elaborate sheet of plane-table work turned in by Assistant A. F. Rodgers. The bold features which mark that part of the Pacific coast are expressed on the sheet by contour lines, the directions of which were carefully determined by levelling. Twelve square miles are thus represented, the topography having an average breadth of nearly two miles. Assistant Rodgers was aided in the field by Mr. Alexander Chase.

Triangulation of Suisun bay, California.—Assistant W. E. Greenwell resumed this work at the limits to which it had been extended in a previous season by Assistant Lawson, and completed the triangulation of the bay in March and April of the present year. In the upper part of the bay his stations were selected so as to include the entrances of the Sacramento and San Joaquin rivers. The points requisite for the purposes of the hydrographic party were furnished by Assistant Greenwell.

Hydrography of Suisun bay, California.—This work was commenced in November, 1865, and was completed in the month of February following, by the party of Assistant Edward Cordell. The soundings, of which an aggregate of twenty thousand were recorded, were made with the schooner Marcy.

At Army Point, (Sketch No. 22,) where the work joins with the hydrography of Captain Alden, day and night observations of the tides were recorded for a complete lunation, and as the work advanced similar observations were made at two stations in the upper bay. In the lower part of the bay the soundings were extended quite into the entrances of the Sacramento and Joaquin rivers. By the heavy rains in January, the water at Sacramento was raised to a level of twenty-two feet above low-water mark.

Mr. W. E. Dennis was attached as aid to the hydrographic party.

Hydrographic examination of Karquinas strait, California.—In March, Assistant Cordell exam-

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