

1860 Field Work

From: "A Report upon the Progress During the Past Year of the Survey of the Northern and Northwestern Lakes"

Dated October 20, 1860. Written by George G. Meade - Captain Topographical Engineers in charge Survey of Northern and Northwestern Lakes. [Later he commanded the Union forces at the Battle of Gettysburg.]

. . . I accordingly recommended the extension of the previous survey of the Beaver Islands, in the north end of Lake Michigan, to include the Fox and Manitou islands, Grand and Little Traverse Bays, a portion of the lake region of the greatest importance as it is on the highway connecting Buffalo and Chicago, and as much frequented by vessels as any other portion of the lakes. The Bureau of Topographical Engineers approving of the recommendation, the organization and assignment of parties was made with a view to execute the above survey, and completing that of Lake Huron, which was not quite finished at the close of last season.

The parties placed in the field were in number and position as follows, Three shore-line, topography, and hydrography, in Lake Michigan; two triangulation parties in Lake Michigan; and one in Lake Huron; two astronomical and one magnetic party operating in both Lakes Michigan and Huron; and one off-shore hydrographical party in each Lake.

In reporting the work of these parties frequent reference will be made to Appendix No. 6, containing the abstract of the work of each, and to the sketch, accompanying this report, marked No. 4, on which is projected the field occupied.

Shore-Line Topography and Hydrography. - Early in May, Assistant W. H. Hearing, aided by Messrs. W. T. Casgrain and Jos. Stringham, constituting a topographical party, was placed on the east coast of Lake Michigan near Middle Village. Assistant Hearing was directed to commence his survey at the point where the survey of 1855 terminated, and extend his work, carrying his soundings to the limits of four fathoms in depth and one half mile in distance, till he should connect with one of the other parties. This junction was effected by the 1st instant. Assistant Hearing having in the meantime, as will be seen by his report, traced 104 miles of shore-line, including sixty-seven square miles of minute hydrography, and thirty square miles of detailed topography. This work includes Little Traverse bay and the excellent harbor of refuge in it, the data for a chart of which is thus obtained. Assistant Hearing's work also includes the whole of the east coast of Grand Traverse Bay, he connecting with Assistant D. F. Henry at Deep Water point in the eastern arm of that bay.

Another topographical party under the charge of Assistant H. C. Penny, was placed at Point aux Besc-scies [Point Betsie], on the east coast of Lake Michigan, with orders to work in a northerly direction, under similar instructions to those given Assistant Hearing in regard to the limit of the hydrogeography. Assistant Penny accomplished the task assigned to him by the 3d instant, connecting with Assistant D. F. Henry near Traverse city, having surveyed, according to his report, 108 miles of shore-line, including sixty-five square miles of minute hydrography and fifty square miles of topography. Assistant Penny's work includes the whole of the west coast of Grand Traverse bay, and the shore of Lake Michigan from the foot of this bay to Point aux-Becs-scies, containing the harbor of refuge at Northport, a place of growing importance, and several other settlements on the coast, already frequented by steamers, and the approaches to which, when made known, will prove of great value.

The third topographical party placed in the field was assigned to Assistant D. F. Henry, with Messrs. E. B. Wright and A. M. Adams for assistants. Assistant Henry was directed to commence his work at the South Manitou Island, to survey both the Manitous and Foxes, on completing which, he was to commence at Deep Water point, in the eastern arm of Grand Traverse bay, and extend his work around Mission point till he effected a junction in the western arm with Assistant Penny. The duty assigned Assistant Henry was successfully accomplished by the 3d instant, he then connecting with Assistant Penny at Traverse City. During the season, Assistant Henry reports having surveyed ninety-one miles of shore-line, including fifty-one and one half square miles of minute hydrography, and fifty square miles of topography. The surveys of Assistant Henry furnish the data for a chart of the harbor of South Manitou, a place of refuge of constant resort by vessels during stormy weather. They also make known the approaches to the Fox Islands, and their availability in affording anchorage and shelter in storms, knowledge of the greatest value to navigators, as at present there is but little known about them.

It will be seen by the foregoing, that from the middle of May to the 3d instant, a period of four and one half months the three topographical parties accomplished the survey of 303 miles of shore, covering 183 square miles of hydrography, and 130 square miles of topography, an amount of work never exceeded in the annals of the survey; due, in great measure, to the favorable character of the weather in the early part of the season, but principally to the energy and zeal of the chiefs and assistants of parties, who, knowing my desire to accomplish this work during the season, left no exertions unshared to attain the desired result. It is due to these gentlemen that I should express my satisfaction, and return them my thanks for their efforts to respond to my wishes.

-Pages 313 - 314 in: Report of the Secretary of War, which Accompanied the Annual Message of the President of the United States to the Two Houses of Congress, at the Commencement of the Second Session of the Thirty-Sixth Congress. Volume II. (Washington; George W. Bowman, Printer, 1860).

Topography and in-shore hydrography.—Each shore-party consisted of a chief of party, three or four assistants, and the requisite number of chainmen, leadsmen, and boatmen to furnish the necessary assistance to the topographers, and crews for three or four six-oared cutters. They had a complete camp equipage, and established their camps on shore, and after surveying for six or seven miles on either side of a camp, moved to a new location. Two to four such parties took the

field each season. They extended a secondary or tertiary triangulation, developed from bases measured with wooden rods or chains, over their field of work. Frequent observations for azimuth and variation of the compass were made, on Polaris usually. The shore-line and the important features of the topography were determined with the theodolite and chain. The shores of the upper lakes being generally either densely wooded or marshy, the topography back from the shore was as a rule simply sketched, detailed surveys being made only where there were settlements or towns. The in-shore hydrography usually covered the area from the shore to the 3- or 4-fathom curve, but included the development of all shoals or dangerous places within several miles of the shore. The lines of soundings were run between buoys anchored at convenient points and sounding stations on the shore, the soundings being taken at regular intervals of time.

1901 Field Work

From: Annual Reports of the War Department for the Fiscal Year Ended June 30, 1902 (Report of the Chief of Engineers. Part 4.

Surveys . . . Resurveys of several localities in the northern end of Lake Michigan were made under the immediate charge of Assistant Engineer L. C. Sabin, and much information obtained, the most important being worked up at once and published on new charts of "South Fox Island shoals" and "Manitou Passage." Some new shoals were developed and several reported by vessels were found in localities differing materially from those given.

- page 2767 (*Report of Maj. Walter L Fisk, Corps of Engineers, for the fiscal year ending June 30, 1902*).

The survey of the northern end of Lake Michigan. - This work was under the direction of Assistant Engineer L. C. Sabin, with party quartered on the steamer *Search*. Field operations began in June of last year and continued until October 25th, when this party was detailed to the completion of the St. Clair River survey, above described.

The work accomplished within the period specified was a detailed survey of the large shoal area off the south end of South Fox Island, a detailed survey of the shoal area of about 6 square miles lying just south of South Manitou Island, a detailed survey of the shoals off Pyramid Point, and a detailed survey of the shoal water off the south end of South Manitou Island. In addition, the topography adjacent to the shore line was taken of South Fox Island, of the south end of North Manitou Island, of Pyramid Point from Port Oneida to within about 1 mile of North Unity, and of South Manitou Island. A survey of that portion of Charlevoix near the harbor was made, and some soundings were taken in the north end of Pine Lake.

All of this work with the exception of that at Charlevoix was based upon the old triangulation of the sixties, but only after considerable labor in searching for the old stations. The records of this old work give no information as to the marking, and no descriptions of the old stations, leaving only their positions upon the old topographic sheets as a guide. In the future extension of this work it will unquestionably be necessary to execute sufficient triangulation to thoroughly control all topography and hydrography.

The results of this work are plotted on seven detail sheets on a scale of 1:5000, and reveal several new shoals not heretofore known.

The details of this work are given in Mr. Sabin's report.

- p. 2774 - 2775 (*Report of Mr. E. E. Haskell, Principal Assistant Engineer for the fiscal year ended June 30, 1902*)

PORT HURON, MICH., June 30, 1902.

MAJOR: I have the honor to submit the following report of the operations of the party working under my immediate direction during the fiscal year ending June 30, 1902.

For a systematic presentation of the work accomplished it is divided into three parts, as follows: First, general operations during the year; second, resurvey of the St. Clair River; and third, discharge of the St. Clair River.

GENERAL OPERATIONS DURING THE YEAR.

The beginning of the year found the party on the steamer *Search* engaged in making surveys in the northern end of Lake Michigan. For the greater part of the field season there were 19 men in the party, 11 of whom were most directly concerned with the operation of the steamer, while 8 were engineers, recorders, and rodmen.

The first area surveyed was the South Fox Island shoals, an area averaging about 1 mile in width and extending southerly from South Fox Island to a point about 9 miles from the light-house. The axis of the island is so nearly in line with the shoal as to make the accurate location of soundings somewhat difficult, and no other land was near enough to be used for the location of sextant signals in ordinary weather.

A short base line was measured at the southeast end of the island from which an observing point was located on the shore about $3\frac{1}{2}$ miles NNW., and another point on a bluff NE. of the light-house. Soundings within range of vision were located by transit intersections from these two stations. On the outer area, however, barrel buoys were so placed as to inclose the area and were located by transit intersections from the shore stations on days when the seeing was exceptionally good. Soundings were then located by sextant angles to the buoys. Sixteen thousand five hundred soundings were taken in this locality, and many shoals were found which did not appear on the old charts. In fact, so many shoal areas were developed that a gas buoy has since been established to show the locations of the best crossing.

A topographic survey of the southeast end of the island was also made and the shore line of the entire island was taken. The old triangulation station, "South Fox" (1864), one of the stations of the connection between Green Bay and the east shore of Lake Michigan, was found, and referenced and tied in with the shore traverse. The remains of the observing tripod were found on the ground and the stone monument was in place. Four cedar reference stakes 4 feet long and blazed on the side next the station were driven 2 feet into the ground. One is N. 33° E., 15 feet from the station, one S. 46° E., 20 feet, one S. 22° W., 45 feet, and the fourth is N. 45° W., 45.4 feet. A sketch of the immediate locality is shown on map No. 46.

The survey of the area lying south of North Manitou Island was entered upon August 8. This area is irregular in shape and contains about 6 square miles. Two observing stations were located on the south end of the island by triangulation from measured base line, and all soundings were located by transit intersections. Thirteen thousand seven hundred and fifty soundings were taken on this area, and two important shoals were discovered lying outside of any previously known. These shoals were soon afterwards provided by the Light-House Establishment with a gas buoy and a can buoy, respectively, and all boats are now warned against crossing the area between the buoys and the island.

The topography of the south end of North Manitou Island was taken and a large part of the shore line of the island was relocated. Search was made for the old triangulation stations "North Manitou" and "Northwest Manitou," but without success. What appeared to be a part of the observing tripod at "North Manitou" was found, but a large excavation failed to find the monument. The actual position of Δ "Northwest Manitou" which, with Δ "South Fox," formed the east side of the quadrilateral from Green Bay, was indefinite, and a thorough search failed to reveal the station. A station was found with observing tripod lying on the ground and large center post broken off at the ground surface. This center post was renewed and the point was tied in with the shore traverse, but it is thought that this was an older or an auxiliary station.

The survey of Pyramid Point shoals was begun August 27. The area covered by the soundings was about 6 square miles and 7,600 soundings were taken. A system of triangulation on Pyramid Point was impracticable without building high stations and the observing stations for transit intersection were therefore connected by a double traverse and checked by triangulation from North Manitou Island. The soundings at this point revealed a shoal not shown on the old charts and having $14\frac{1}{2}$

feet of water. The contours on the eastern part of the area were found to be quite different, and the shoal on the west side, supposed to have 15 feet of water, had in reality less than 10 feet.

The shore line of Pyramid Point was relocated from Port Oneida to within about 1 mile of North Unity. The old triangulation station "Pyramid Point" was found, the observing tripod being in place but not plumb. What was apparently at one time a post for the instrument had been sawed off at the ground surface. The station was repaired roughly and occupied. The old station "Sleeping Bear" was also found and the side "Pyramid Point"- "Sleeping Bear" was used as a base in a quadrilateral including "South Manitou" light-house and \triangle "Spruce," a station on North Manitou Island near the location of the old station "North Manitou."

\triangle "Pyramid Point" was referenced to three cedar stakes and a blazed tree, notes in book 425. \triangle "Sleeping Bear" was referenced to three 1½-inch gas pipes, 6 feet long, driven to surface of ground; witness pipe No. 1, 25 feet W. $21^{\circ} 15' S.$; No. 2, 9.75 feet E. $22^{\circ} 08' S.$; No. 3, 10 feet N. $18^{\circ} 06' E.$

The survey of the area south of South Manitou Island, which was the last one to be surveyed in that locality during the season, was entered upon September 11, but the weather was so unfavorable thereafter that work was not completed till October 22.

For sounding locations sextant signals were placed at the south end of the island, and these were connected by a double traverse. A small triangle system served to check the traverse. The entire shore line of the island was relocated and the topography in the vicinity of the small settlement on South Manitou Harbor was taken.

No new shoals of special importance were found on this area except one having 20 feet of water 3 miles southwest of the light-house. The 18-foot spot, 4½ miles WSW. of the light-house shown on old charts of this area, was not found.

In connection with the examination of the areas mentioned above, advantage was taken of bad weather that interfered with the regular work to attempt to find triangulation stations "Cat Head" and "Pine River" and the shore line between Cat Head and light-house points was taken. At the same time two stations were established for the purpose of locating soundings on the shoal about 7 miles north of these points, but no opportunity presented itself for making a thorough examination of this area.

At the location of \triangle "Cat Head" a few decayed timbers were found which may have formed a part of the old observing station, but quite a large area at the highest point of ground was carefully dug over without discovering any station mark. The search for \triangle "Pine River" was also fruitless, though the top of the hill on which it had been located was thoroughly dug over. The reports of the character and location of this old station, gathered from the old inhabitants of Charlevoix, were somewhat conflicting. One said a hemlock tree from which the branches and top had been cut served as a center post. Another said the station stood near a large oak. A large oak stump was found on top of the hill. The summit of the hill was not large. A survey of that portion of Charlevoix near the harbor was made, and soundings were taken in the north end of Pine Lake.

The work in the northern end of Lake Michigan was greatly delayed by repairs that were required from time to time to the water-tube boiler of the steamer. The first failure of a tube occurred June 28, and failures became frequent toward the end of the season. After September 5 there were very few days when the weather was good enough to permit accurate soundings to be taken in the exposed areas under examination. The party left for St. Clair River October 25, and spent a part of one day sounding in Grays Reef passage. On October 26 four bench marks were established at Mackinaw City, and a line of levels was run connecting these with the staff gauge read in connection with self-registering gauge at this point. Coasting along the west shore of Lake Huron, all available information concerning docks and towns on this shore was collected, and Port Huron was reached on October 29.

The continuation of the survey of St. Clair River was taken up at once and completed on December 3. The triangulation was carried to the St. Clair Flats Canal light-house. Below the church at Harsen Island the topography on the right bank