

ART. V.—SABLE ISLAND, (CONTINUED.) BY S. D. MACDONALD,
F. G. S.

Read Feb. 10, 1884.

IN my former Paper on Sable Island I introduced to your notice its general features, intending at some future time taking up and working out in detail, some of its most remarkable points of interest. To-night I would call your attention to some of the many changes it has undergone, which have materially altered its position.

On the early charts of this coast compiled and corrected from those of the French, and published in 1775, this island is shown as occupying a position between $60^{\circ} 05'$ and $60^{\circ} 45'$ W. long., 40 miles in length and $2\frac{1}{4}$ miles in breadth.

In 1799 a special survey of this island was ordered by the admiralty, and the chart we have before us this evening was issued together with numerous views of its appearance from different points of approach, also a scene of what is evidently an encampment of shipwrecked persons among the east end, naked sand hills. Many of the party are dressed in antique costumes, cocked hats, &c.

Those naked sand hills have always been an object of peculiar interest here, owing to their assuming such fantastic shapes, and by their colour, being more readily seen in the distance. Viewed in this engraving they appear to have attained quite an elevation.

On a plan published by Mr. Darby, one of the superintendents, is a cone shaped drift at the western extremity, marked the "volcano," said to be upwards of 100 feet in height, similar to one of those represented in this engraving. But the volcano has been dispersed. The position it occupied passed seaward many years ago, and now lies fathoms deep.

This survey appears to have been a very elaborate one and well prepared, upwards of 500 soundings are represented in the immediate vicinity of the island, and on the bank. This has resulted in locating the island as follows :

West end $60^{\circ} 32'$, east end $60^{\circ} 01'$. Length 31 miles, breadth 2 miles. Showing a decided decrease in area since previous observation, and placing the west end ~~7~~₂ miles further east.

The next survey was that of 1808 of the Island proper, ordered by General Sir George Prevost, then Governor of this Province, who moved by the terrible circumstances attending the loss of the troop ship "Princess Amelia," made every effort to induce the British Government to erect or aid in the erection of a light house on the Island.

Lieut. Burton of the Fusiliers, then stationed at Halifax, was dispatched to report on the feasibility of erecting a light, and to inquire into the wants of the Island.

From this report we learn the Island was 30 miles in length and 2 miles in breadth, with hills from 150 to 200 feet, beginning at west end and attaining their greatest elevation at Mount Knight, its eastern extremity.

Just a few words here with regard to the correctness of this first chart. It may be thought by some that little dependence should be placed on a chart compiled at a time when so little was known of the coast. But we have only to remember that this Island was well known to the French as early as 1598, and that forty years previous to this chart being compiled the walled City of Louisburg was at the zenith of its prosperity, with its magnificent fortresses which were 30 years in building at a cost of five millions five hundred thousand dollars, the station of a powerful French fleet which for armament and numbers has never been seen in North American waters since, and a city whose commerce was of no little importance.

Then, as now, in early springtime the Gulf of St. Lawrence current brought down its fields of ice blockading the south shores of Cape Breton. To avoid which those cruisers and merchantmen bound for the harbour of Louisburg were compelled to run south and westward, making an off shore approach which would throw them in the immediate vicinity of the Island. Also on two occasions a British besieging squadron lay before that city and cruised off its shores, the strength of which can be estimated when we learn that on one of those occasions 140 sail, of which 36 were frigates and ships of the line, left Halifax for Louisburg in a single day.

All this seems to warrant the conclusion that the knowledge

possessed in early times of the coast and the adjacent islands was even greater than ours of to-day. And it is difficult indeed to give a satisfactory explanation of the variation of those charts unless we attribute it to actual changes undergone. But let us proceed.

In 1850 the late Hon. Joseph Howe visited this place as commissioner, for the purpose of making himself personally acquainted with the Island and its requirements. In his report he called the attention of Parliament to the rather startling fact, that by actual measurement the island had decreased at the west end 11 miles in the last 30 years. And further, for the safety of navigation and the prevention of disasters their first duty with regard to Sable Island was to have the position defined.

In the cabin of the "Daring" before him lay a chart by which that vessel was supposed to be navigated, also another compiled from observations taken by Capt. Darby in 1829. The discrepancy between which, and its possible effect on navigation, was appalling to contemplate.

The variations were as follows:—

The cutter's chart, W. E. 60° 32' W. lon.

“ “ E. E. 60° 03' “

Darby's chart, W. E. 60° 10' W. lon.

“ E. E. 59° 48' “

Difference 22 miles.

This chart on board the cutter appears to have been one issued about 1815, on which the island is made to be 29 miles in length, a difference of 2 miles smaller than the chart of 1799.

On the strength of Mr. Howe's report, the admiral was communicated with, who ordered Commander Bayfield and staff to the island for the purpose of making a new survey. A corrected chart was issued by Bayfield the following year, locating the Island as follows: W. E. 60.08., E. E. 59.45., showing a still further reduction of area, and placing the west end 2 miles still further eastward than shown by Darby's chart of 1829.

Surprising as this evidence of change may appear it is fully borne out by the testimony of all those whom fortune has led in the interests of humanity to dwell upon its shores.

The position chosen for the main station in 1802 was one remarkably sheltered among the sand hummocks at a distance of 5 miles from the west end.

In 1814 the superintendent, Mr. ~~Hudson~~ ^{Hodgson}, wrote the Government, that owing to the rapid manner in which the island was being washed away it would be necessary for him to remove the establishment to a more secure position; that within 4 years previous, 4 miles had gone entirely from the west end, leaving but a mile between him and the sea, which was advancing steadily. On the north side an area equal to 40 ft. wide and 3 miles long had gone bodily from the island during a single night. He intended moving the buildings to a place called "Middle Houses," 3 miles further east.

In 1820 the superintendent again wrote the Government, "that not only had the old site of the main station gone seaward; but the sea was again encroaching to such an alarming extent that he would be obliged to once more remove the station, and had selected a place known as the "Haul over," 4 miles further east. This moving of the main station incurred no little trouble consisting as it did of superintendent's dwelling, another for the staff, a sailor's home for the accommodation of shipwrecked persons, stores for provisions and material saved from wrecks, barns, workshops, boat house, &c.

Again the sea advanced, the two following winters were noted for the frequency of storms and the havoc made along the sand cliffs, every gale sensibly diminishing the western portion of the island, toppling great masses of sand hills into the surf below as well as changing the surface of the interior. One instance I have already mentioned in my last paper when thousands of tons of sand were carried from the beach and strewn over the island, smothering vegetation, so that hundreds of horses died for want of food.

Seeing the necessity of securing more permanency for the main station, and the buildings from being so often removed, becoming dilapidated, the present position was selected on the broadest and most protected portion of the Island and new buildings erected in 1833. The old dwelling of the superinten-

dent was again removed 4 miles further east and used as a house of refuge. Here it enjoyed a short respite when again the sea threatened its foundation. This marks the 11 mile point mentioned in Mr. Howe's report.

Now all this seems so much like romance that were it not for the authenticity given it by parliamentary reports and the records of the Island, I should hesitate in giving currency to these statements.

But I think I hear you say,—What of that house—is it still moving?

No, it is now at rest, it has found a grave, for the fourth time it was moved, this time 2 miles further east. Gradually the gales removed the hummocks that sheltered it. Then, left to the rake of the winds, sand laden eddies twirled about it till slowly mound arose closing it from sight, the house, and the surface became levelled out above it.

Another short rest and again it may open up to view, and be bared to its foundation, or be thrown down with the embankment and floated away by the current.

Between the years 1850 and 1881 this western portion of the island appeared to enjoy a period of comparative repose. This may be accounted for by the fact that so much material had been thrown down a shoal was formed to the west on which the seas would probably break before reaching the sand bluffs and thus lose their abrading force. In the same manner the main body of the island is defended by three parallel bars which act as barrier reef, and protect or at least retard the work of devastation which would otherwise proceed with great activity. On the removal of this shoal to the westward, by the currents, the seas began again to manifest their force.

The winter of 1881 was remarkably stormy, gale succeeding gale in quick succession. In addition to this gradual work of erosion great areas were removed bodily. During one gale 70 feet by $\frac{1}{4}$ mile departed, a month later 30 feet of the whole width of the island disappeared in a few hours.

The winter of 1882 was even worse than the preceding one, and was noted for the destruction wrought among the buildings,

including the west end light house, a magnificent structure erected in 1873, one mile inside the grass hills.

Early in Feb'y. of that year a gale of unusual violence visited the Island accompanied by very high tides; already the sea had removed the embankment to within 40 feet of the bluff on which the light house keeper's barn stood, and within dangerous proximity to the light house itself. As the tide rose the gale increased. All hands were now out ready for any emergency that might require their presence.

The cattle had been removed to the porch of the light house. As the staff were watching the force of the waves that were now undermining the embankment with great rapidity, suddenly a depression along the margin of the cliff gave warning of a downfall. The next instant an area equal to 48 feet broad and a $\frac{1}{4}$ of a mile long descended into the surges on the north side, while during the night the 40 feet in front of the barn and along the sand bluff dissappeared; next morning the barn went crashing below and was swiftly carried away by the current.

The storms that produce the most destruction are those from the S. E. bringing in heavy seas, which striking obliquely on the south shore aided by the powerful current setting to the west erode the sand cliffs until large masses are detached, fall into the current, and are carried forward. This also helps to prolong the N. W. Bar.

Again, during calm weather when winds and waves are still, the shores and bars are white with foam from the ever present ground swell which renders landing so precarious; it is seldom attempted except by the surf boats at the station.

In the loss of the west end light-house we have a remarkable instance of the wasting force of this swell. The weather had been unusually quiet for the space of two days, during which time a heavy ground swell hove in from the S. E., (probably from a gale passing along the gulf stream), which carried away the remaining 12 feet of embankment in front of the light house, causing it to lean dangerously forward, and necessitated the hasty removal of the apparatus. From this time the light ceased to send its warning across the waves.

While changes are readily observed along the bluffs the beach itself is continually varying in form, increasing and diminishing in particular parts. In this way old wrecks are brought to the surface and others concealed during a single gale.

Some years ago, after a heavy gale, spars, canvas huts, &c., showing a prolonged stay of which there is no record, were discovered. This spot has also passed under the sea.

In 1837 Mr. Miller, the third commissioner appointed to enquire into the possibility of erecting a light house, reported that on visiting the Island he found the position chosen by him in 1833 had undergone a complete change. The site selected by a former commissioner favorable to the project, had been completely removed by the high winds that have at times so much effect in causing remarkable changes in the interior, as well as on the shores of the Island. He would only feel justified in recommending a temporary erection, such as could be easily removed to a more permanent position when necessity required it.

We can readily understand how hills of loose sand thrown up by the wind into every fantastic shape that snow drifts can assume, are ever changing their extent and position.

The removal of those sand drifts or dunes have brought some interesting historical facts to light.

In 1842 during a severe gale an old landmark in the form of a pyramid near the west end station, said to be 100 feet in height, was completely blown away, exposing to view several small houses built from the timbers and plank of a vessel; on examination they were found to contain quite a number of articles of furniture, stores put in boxes, bales of blankets, quantities of military shoes, and among other articles a dog collar of brass, on which was engraved the name of Major Elliot, 43rd Regt.

It was afterwards ascertained that this regiment while returning to Halifax after the siege of Quebec, was wrecked here, but afterwards taken off without loss of life.

Many years ago a roundsman's attention was attracted to a blackened line along the sand cliff; on climbing to the place and removing the sand he uncovered what afterwards proved to be the

site of an old encampment. Here lay rusty guns and bayonets, knives made from iron hoops, broken glass, a tattered English ensign, human bones, mingled with those of cattle and seals, an English shilling of the reign of Queen Elizabeth, sharp as when taken from the mint which furnishes the date of the disaster. But nothing further left to give a clue to the sufferers, except that they were Englishmen.

Thus those gales are ever bringing to view, evidence of calamity of which history and tradition are equally silent.

Turning to the lake we find more proof of the vicissitudes this Island has undergone. When first known the lake had an opening on the north side which was afterwards closed. A few years later during a terrific storm the seas forced a channel through the lake margin on the south side rendering it a convenient harbour for small vessels. But in 1836 a similar tempest closed it again, shutting in two American fishermen, who ran in for shelter on seeing the storm approaching.

Gradually it became very shoal from the material drifting into it, but being dammed up by the closing of the inlet and filled by the surf washing across the ridge, it afforded great facility for forwarding the life boat in case of a wreck, and the transport of wrecked material to main station for shipment.

During the winter of 1881, a severe gale opened a gulch towards the east end, so draining it as to reduce it to 8 miles in length and rendering it useless as a means of transport.

The lake margin forming the south shore in like manner testifies to the destructive agency of the sea. Having a breadth at one time of $\frac{1}{2}$ a mile, with sand hills of upwards of 50 feet in height; at present it is merely a narrow ridge forming a precarious sea wall, over which the waves now break in heavy weather. Should this inner barrier be removed the work of demolition will go forward with increased rapidity.

During storms, in addition to the actions of waves and currents, the winds independently ravage its surface.

Finding a raw spot, as it is termed, the eddying winds scoop out the loose sand (when not confined by the roots of the grass) into bowl-like depressions, which afterwards form those fresh

water ponds so often found in the interior, while around the stations it requires the utmost vigilance of the men to watch the first break in the sod and repair it before headway is gained, otherwise the buildings would soon go from their foundations.

While the wind and waves have been so active modelling and remodelling the Island proper, currents and eddies have also been at work on its submerged portion, although from the difficulties attending observations we are not cognizant of the various changes taking place. One however, fraught with much danger, is making itself manifest in a painful degree, that is, the prolonging and shoaling of the north east bar.

By reference to this wreck chart, it will be seen that most of the wrecks of late years have occurred here, some of them being as much as 16 miles from the light.

The changing character of the bar at the other extremity of the Island may be inferred from an extract of Capt. Darby's reports in Blunt's Coast Pilot of 1832, as follows:—

"I have known this Island for 28 years, during which time the west end has decreased in length 7 miles, although the outer breakers of the N. W. bar have the same bearings from the west end of the Island as they formerly had, demonstrating that the whole bank and bar are travelling eastward."

With regard to this Island having travelled the entire distance shown by those charts, it would be rather hazardous to adopt such a conclusion. Yet it is certain that its progress eastward is in keeping with the natural tendency of all sand accumulations, and although the material may be carried sometimes one way and sometimes another, yet nevertheless its progress must still be in the direction of the prevailing wind.

In some parts of the world in consequence of the preponderance of certain strong winds in one direction, such accumulations make a regular progressive movement, and have buried farms, houses, cities, and even whole tracts of country, of which there are numerous instances on the English and French coasts.

At this island the strong west wind is as constant as a trade wind, and its material is being constantly blown before it.

In this way the amount drafted from west to east must have

been enormous and may account to a great extent for the diminished height of the Island. At the same time I think we are justified in concluding, that while the Island has traversed a certain portion of this distance, its changed position as here indicated by those admiralty surveys, is mostly due to submergence.

Of course an Island so constituted, exposed to the unobstructed violence of the whole Atlantic, could not long resist the terrible abrading force of the breakers, aided by swift currents, and the denuding effects of wind and rain.

Already we have seen that within a comparatively short space of time, dating back but a few years previous to the founding of the life saving station, it has decreased in length from 40 miles to 22; in breadth from $2\frac{1}{2}$ miles to something less than 1 mile; in height from 200 feet given in 1808 to 80 feet, according to the latest observations.

The future of this Island to the navigator is everything but cheering. Should those destructive forces now in operation continue, we might easily calculate on a period, and not a remote one, when the sea will claim it as its own.

ART. VI.—GLACIAL ACTION, AT RIMOUSKI, CANADA, AND LOCH ECK, ARGYLESIRE, SCOTLAND. BY REV. D. HONEYMAN, D. C. L., F. S. A., &c., *Curator of Provincial Museum.*

(Read. 10th March 1884.)

ON the 3rd of last November I made an observation near the I. C. R. Station at Rimouski, which I regard as interesting. On both sides of the Road I found and examined boulders, many of which were of large size; one had been blasted to make way for a fence. Others were evidently undisturbed, being, doubtless, in the positions in which they had been deposited during the glacial epoch. They are of crystalline rocks, of the Archæan (Laurentian,) formation. There are no exposures of rocks in the vicinity