

Residuum.....	\$10,109
Rye.....	81,431
Rye flour.....	546
Sugar.....	24,201
Tallow.....	860,057
Tobacco leaf.....	877,406
Wheat.....	9,886,483
Wheat flour.....	992,408
	48,379,031

Exports of grain and petroleum from the port of Philadelphia from 1870 to 1878 inclusive.

Years.	Grain.	Oil.	Years.	Grain.	Oil.
	<i>Bushels.</i>	<i>Barrels.</i>		<i>Bushels.</i>	<i>Barrels.</i>
1870.....		1,101,636	1875.....	7,631,916	1,367,574
1871.....	2,797,946	1,256,866	1876.....	20,839,420	1,398,935
1872.....	3,665,763	1,221,252	1877.....	12,888,269	986,799
1873.....	3,691,035	1,891,764	1878.....	28,684,487	1,503,833
1874.....	5,241,365	1,572,242			

Shipments of anthracite coal from Port Richmond by the Philadelphia and Reading Railroad Company from 1870 to 1878 inclusive.

Years.	Tons.	Cwt.	Years.	Tons.	Cwt.
1870.....	1,951,467	07	1875.....	1,703,459	17
1871.....	2,343,025	19	1876.....	1,832,627	19
1872.....	2,238,850	01	1877.....	2,784,657	05
1873.....	2,226,865	14	1878.....	2,135,215	08
1874.....	2,051,127	14			

RECAPITULATION.

Statement of the value of exports to the following countries.

Countries.	American vessels.	Foreign vessels.	Total value.
Austria.....	\$64,315	\$192,653	\$256,968
Belgium.....	186,821	6,629,720	6,816,541
Brazil.....	450,038	135,257	585,295
Chili.....		20,181	20,181
Denmark.....		233,409	233,409
Danish West Indies.....	32,009	2,240	34,249
France.....	84,417	2,011,198	2,095,615
French West Indies.....	31,316	20,736	52,052
Germany.....	67,427	1,980,418	2,047,845
England.....	7,266,887	16,583,272	23,850,159
Scotland.....	32,905	796,680	829,585
Ireland.....	148,739	4,228,873	4,377,612
Gibraltar.....	33,760	162,586	196,346
Nova Scotia and New Brunswick.....	34,634	19,307	53,941
Quebec, Ontario, &c.....		1,000	1,000
British West Indies.....	465,230	114,691	609,921
British Possessions in Africa.....	24,008		24,008
British Possessions, all other.....		14,300	14,300
Greece.....		7,605	7,605
Italy.....	241,292	1,471,311	1,712,603
Japan.....	419,962		419,962
Netherlands.....		658,710	658,710
Dutch West Indies.....		16,858	17,284
Portugal.....	426	970,194	1,747,511
Russia on the Baltic.....	777,317	7,456	7,456
Spain.....	14,450	8,761	23,211
Cuba.....	960,358	43,482	1,003,840
Porto Rico.....	71,402	30,903	102,305
Sweden.....		53,561	53,561
Norway.....		34,763	34,763
Turkey in Europe.....		19,925	19,925
Turkey in Africa.....	87,493	16,996	104,489
United States of Colombia.....	11,260	8,284	19,544
Venezuela.....	267,317	75,018	342,335
Morocco.....		4,900	4,900
Total.....	11,773,783	36,605,248	48,379,031

Imports during 1878.

Articles of the United States.....	\$38,961
Bark.....	250,432
Books.....	115,164
Breadstuffs.....	9,203
Coffee and spices.....	498,506
Drugs and chemicals.....	1,834,623
Dyewood and dyestuffs.....	70,054
Earthenware and stoneware.....	316,273
Fish and provisions.....	72,858
Grass and seeds.....	33,789
Hair and skins.....	474,465
Iron and hardware.....	1,020,249
Jewelry and precious stones.....	128,791
Metal and manufactures.....	137,129
Mineral and mineral substances.....	42,150
Miscellaneous articles.....	2,910,114
Miscellaneous manufactures.....	1,860,094
Molasses.....	2,260,540
Oil, paints, and glassware.....	210,094
Paper material.....	87,188
Plaster and cement.....	28,275
Salt.....	133,371
Sugar.....	5,196,795
Tin.....	1,570,418
Vegetables and fruits.....	875,528
Wines and liquors.....	225,260
Wool.....	647,873
	21,048,197

Importations of sugar and molasses at the port of Philadelphia, from 1870 to 1878 inclusive.

SUGAR.

Years.	Hhds.	Boxes.	Bags.	Baskets.	Hhds. melado.
1870.....	70,979	30,782	35,943		73
1871.....	74,016	34,747	46,263		1,175
1872.....	53,519	31,485	23,873		
1873.....	71,546	35,662	62,749	5,949	
1874.....	55,936	8,881	27,107	5,453	
1875.....	51,343	15,250	23,969		89
1876.....	44,518	3,976	852		709
1877.....	35,881	2,142	5,464		67
1878.....	78,242	1,673	14,488		

MOLASSES.

Years.	Cuba.	Other kinds.	Total hhd.
1870.....	87,157	2,903	90,060
1871.....	86,432	3,489	89,921
1872.....	114,755	2,635	117,390
1873.....	106,883	1,897	108,780
1874.....	78,413	2,967	81,380
1875.....	99,274	9,193	108,467
1876.....	87,904	2,885	90,789
1877.....	42,940	11,149	54,089
1878.....	64,209	8,466	72,675

RECAPITULATION.

Summary statement of the values of goods imported direct from foreign countries to this port for year ending December 31, 1878.

Countries.	In American vessels.	In foreign vessels.	Totals, 1878.
Belgium.....	\$384	\$699,577	\$699,961
Brazil.....	214,757	108,075	322,832
Central America.....	5,251	3,819	9,070
Cuba.....	5,300,307	753,182	6,053,489
Danish West Indies.....		7,925	7,925
Dutch East Indies.....		64,766	64,766
England.....	6,643,629	3,533,989	10,177,618
British East Indies.....	605		605
British West Indies.....	354,012	243,699	597,711
France.....	14,548	8,395	22,943
French West Indies.....	255,150	296,345	551,495
French Possessions in Africa.....	9,366	28,830	38,196
Germany.....	8,372	259,444	267,816
Greece.....	4,152	53,625	57,777
Greenland.....	4,778	76,020	80,798
Hayti.....	60,250	1,720	61,970
Ireland.....		5,355	5,355
Italy.....	176,520	441,084	617,604
Netherlands.....	5,466	65,694	71,140
Nova Scotia.....	48,696	17,590	66,286
Peru.....	14,192	81,661	95,853
Portugal.....	12,406	46,251	58,657
Porto Rico.....	341,450	119,661	461,111
Spain.....	73,523	205,886	279,409
Sweden and Norway.....	48,500	8,746	57,246
Tarkey in Asia.....		22,571	22,571
United States of Colombia.....	4,586	7,883	12,469
Venezuela.....	190,345	95,179	285,524
Totals for 1878.....	13,791,225	7,256,972	21,048,197

Value of the exports and imports at Philadelphia for the last ten years.

Years.	Exports.	Imports.	Years.	Exports.	Imports.
1869.....	\$15,872,249	\$16,414,535	1874.....	\$29,878,911	\$25,004,784
1870.....	16,694,478	14,952,371	1875.....	31,836,727	24,011,014
1871.....	20,688,551	20,820,374	1876.....	50,539,450	21,009,000
1872.....	20,484,803	26,824,333	1877.....	37,823,356	20,126,032
1873.....	29,683,186	29,186,925	1878.....	48,362,116	21,048,197

The business of the port of Philadelphia for the fiscal year ending June 30, 1879, was the largest ever transacted, the year ending June 30, 1874, being the next largest. Below is a comparative statement of the amount of business done, showing a large increase in the past 5 years:

Receipts from customs, 1879.....	\$9,008,611 09
Receipts from customs, 1874.....	\$8,264,895 53
Value of exports, 1879.....	\$47,007,620 00
Value of exports, 1874.....	\$33,098,905 00
Estimated duties on goods forwarded by—	
Immediate transportation, 1879.....	\$367,588 05
Immediate transportation, 1874.....	\$142,361 13
Number entries merchandise, 1879.....	10,164
Number entries merchandise, 1874.....	9,046
Vessels entered from foreign ports, 1879.....	1,845
Vessels entered from foreign ports, 1874.....	1,193
Tonnage foreign vessels entered, 1879.....	1,323,798
Tonnage foreign vessels entered, 1874.....	638,552
Vessels cleared to foreign ports, 1879.....	1,632
Vessels cleared to foreign ports, 1874.....	1,202
Tonnage foreign vessels cleared, 1879.....	1,228,961
Tonnage foreign vessels cleared, 1874.....	689,230
Number examination packages hauled, 1879.....	24,330
Number examination packages hauled, 1874.....	18,099

E 7.

IMPROVEMENT OF DELAWARE RIVER AT SCHOONER LEDGE.

This reef of rock lying in mid-river between Chester and Marcus Hook is the only one known at the present time to exist in the main channel of Delaware River or Bay. The deepest water over it is 24 feet at mean low-water, and this depth is only 45 feet in width and is found within 150 feet to 200 feet of projecting points upon which are but 18 and 19 feet. To vessels drawing over 18 feet it is a most dangerous obstruction, and its removal is one of the most important improvements that can be made to the navigation of the Delaware.

The act of March 3, 1879, having appropriated \$50,000 for beginning operations, further examination was made for the purpose of securing fuller and more exact information.

A platform carrying a Burleigh drill was placed near one of the projecting points of the reef and a 2½-inch boring made to the depth of 22.8 feet below mean low-water. Owing to the inadequacy of the platform and to the drill not being in good order, the boring was made no deeper, although it had been intended to reach 24 feet or more. The hole was charged with 4 pounds of Lafin & Rand's rendrock, and fired with good effect.

The rock is a species of gneiss, with thin veins of quartz intersecting it. Portions of it contain a considerable percentage of hornblende, which is in other parts replaced by mica. The principal planes of stratification, judging from the ton or more of specimens raised, stand at a high angle of between 75° and 90°, with a northeast and southwest direction, and are crossed by nearly horizontal seams of varying thickness, the whole presenting favorable conditions for drilling and blasting, so far as the material itself is concerned.

The locality, however, is an exposed one, and the tides running from 2 miles to 2.5 miles per hour when opposed by the winds create a heavy sea.

Furthermore, owing to the proximity of the work to the channel, the passing vessels throw a heavy wave. These considerations make it necessary that the drilling platform shall be of ample strength and heavily moored.

A careful resurvey of the reef, with soundings averaging 6 or 7 feet apart, has recently been made, and the chart is in course of preparation. So soon as it shall have been completed further report and recommendations with regard to the execution of this work will be made.

The commerce to be benefited by the improvement is nearly the whole maritime business of the Delaware.

Money statement.

Amount appropriated by act approved March 3, 1879.....	\$50,000 00
July 1, 1879, amount available.....	50,000 00
Amount (estimated) required for completion of existing project.....	177,000 00
Amount that can be profitably expended in fiscal year ending June 30, 1881.....	100,000 00

are frequently occasioned by an insufficient depth of water or narrowness of channel, and vessels sometimes take the bottom and lie aground; but, since the channel-bed and banks are of sand or mud, serious injury is not thereby usually incurred, other than that due to loss of time. These are great inconveniences and restrictions upon commerce, but not dangers. The case is quite different at Schooner Ledge.

The slightest touch is sufficient to tear off the copper, and a heavy blow necessitates docking the vessel at a burdensome expense in addition to that of repairs, while, should the shock suffice to stop the vessel, serious damage is inevitable.

The many pieces of sheathing, crimped like paper, found by the diver upon the ledge attest the frequency of these accidents.

I respectfully recommend the removal of this reef to the depth of 24 feet within the limits indicated by the 24-foot curves inclosing the high points. Although this depth is not so great as it should be, and as it may hereafter be found advisable to obtain, by at least 1 foot, I am guided in this recommendation by the fact that work of this character is very costly, and that to secure 25 feet over the necessary area would nearly, if not quite, double the estimate, and also by the hope that with the Mifflin Bar above and the Cherry Island Flats below, both improved, vessels can so time their arrival at the ledge as to take advantage of the rise of tide to pass in comparative safety, even should they be drawing 24 feet or more.

The sections on the tracing attached to the chart have therefore been prepared, and the amounts calculated upon this basis.

The quantity of rock to be removed is 9,077.6 cubic yards, and the cost, including engineering and superintendence, is estimated at \$25 per yard; total, \$226,940.

The alternative of removing the area above referred to is the construction of a channel entirely west of it of sufficient width and depth, and the building of a light-house over the high points of the ledge of dimensions and solidity sufficient to withstand the pressure of the ice, which in winter moves with the tides in heavy masses known to have been several feet in thickness.

Aside from the fact that a light-house so placed would itself be, to a certain extent, a source of danger in the narrow channel, and always one of expense, the cost of this method of relieving commerce would, it is believed, be not less than the one proposed, which, once made, would be permanent and require no further expenditure.

The rock formation underlies the west bank and extends to the shore, where it crops out in many places, and the smaller amount of rock to be removed to make a channel 400 feet wide west of the high points would in great part be compensated for by the greater additional cost per yard.

Should an appropriation be made for the removal of Schooner Ledge, the project for its expenditure is as follows:

To perform the work by contract after suitable advertisement, and to provide for the removal of one-half the rock during the ensuing season.

It would be preferable to have the entire amount made available at one time, with possibly a proviso that it should not be drawn from the Treasury until required.

This would prevent possible embarrassment from failure of funds, and give the contractor proper assurances, which would justify him in providing suitable and sufficient plant. Any uncertainty on this point would inevitably involve additional expense to the United States.

As this work is distinct in character from any works of improvement hitherto projected for the Delaware River, and as the total sum required for this particular locality will be so considerable, I respectfully suggest that the appropriation, therefore, should be specifically for the removal of Schooner Ledge.

The survey, the results of which are shown on the accompanying chart, was conducted as follows:

Two observing stations were selected, from which the whole field was visible, and determined from points on a base line 2,335 feet in length.

The surveying launch moved freely over the area to be examined, at first on range lines, afterwards between and across them. Soundings were taken every half minute, and the position of the pole determined for each by the intersection of transit lines from the stations.

After plotting these soundings, which were some 1,300 in number, covering all the rock work, a few additional lines were run in the launch with sextant angles, supplying about 500 additional soundings to fill out the chart to desirable limits. Subsequently a diver was sent down to examine the character of the bottom and rock and to procure specimens of the material.

The rock is a rather soft, fine-grained micaceous gneiss, of close, firm texture, and somewhat indistinctly stratified.

The rock, wherever examined, was in solid bed, and, in connection with its structure, offers advantageous conditions for drilling and blasting.

Very respectfully, your obedient servant,

WILLIAM LUDLOW,
Captain Engineers, Brevet Lieutenant-Colonel, U. S. A.

Col. J. N. MACOMB,
Corps of Engineers, U. S. A.

E 8.

IMPROVEMENT OF DELAWARE RIVER AT CHERRY ISLAND FLATS.

My report of December 2, 1878, hereunto appended, gives a succinct statement of the particulars with regard to this locality, and submits project and estimates for its improvement.

The act of March 3, 1879, having appropriated \$100,000 for beginning operations, it is proposed, so soon as the appropriation shall have become available, to advertise at once for proposals, and to enter upon the work at the earliest day possible.

The serious character of the obstruction caused by these flats to the navigation of the Delaware was clearly shown during the winter, when at several different times they sufficed to block the movements of vessels over them for periods varying from a few hours to 2 days.

Money statement.

Amount appropriated by act approved March 3, 1879	\$100,000 00
July 1, 1879, amount available	100,000 00
Amount (estimated) required for completion of existing project	204,000 00
Amount that can be profitably expended in fiscal year ending June 30, 1881.	100,000 00

REPORT OF COL. JOHN N. MACOMB, CORPS OF ENGINEERS, DATED DECEMBER 2, 1878.

UNITED STATES ENGINEER OFFICE,
Philadelphia, Pa., December 2, 1878.

GENERAL: After careful examination of the Delaware River in the vicinity of the Cherry Island Flats, considered in connection with the legitimate requirements of the navigation interests involved, I have the honor to submit the following report on and project for the improvement of this locality:

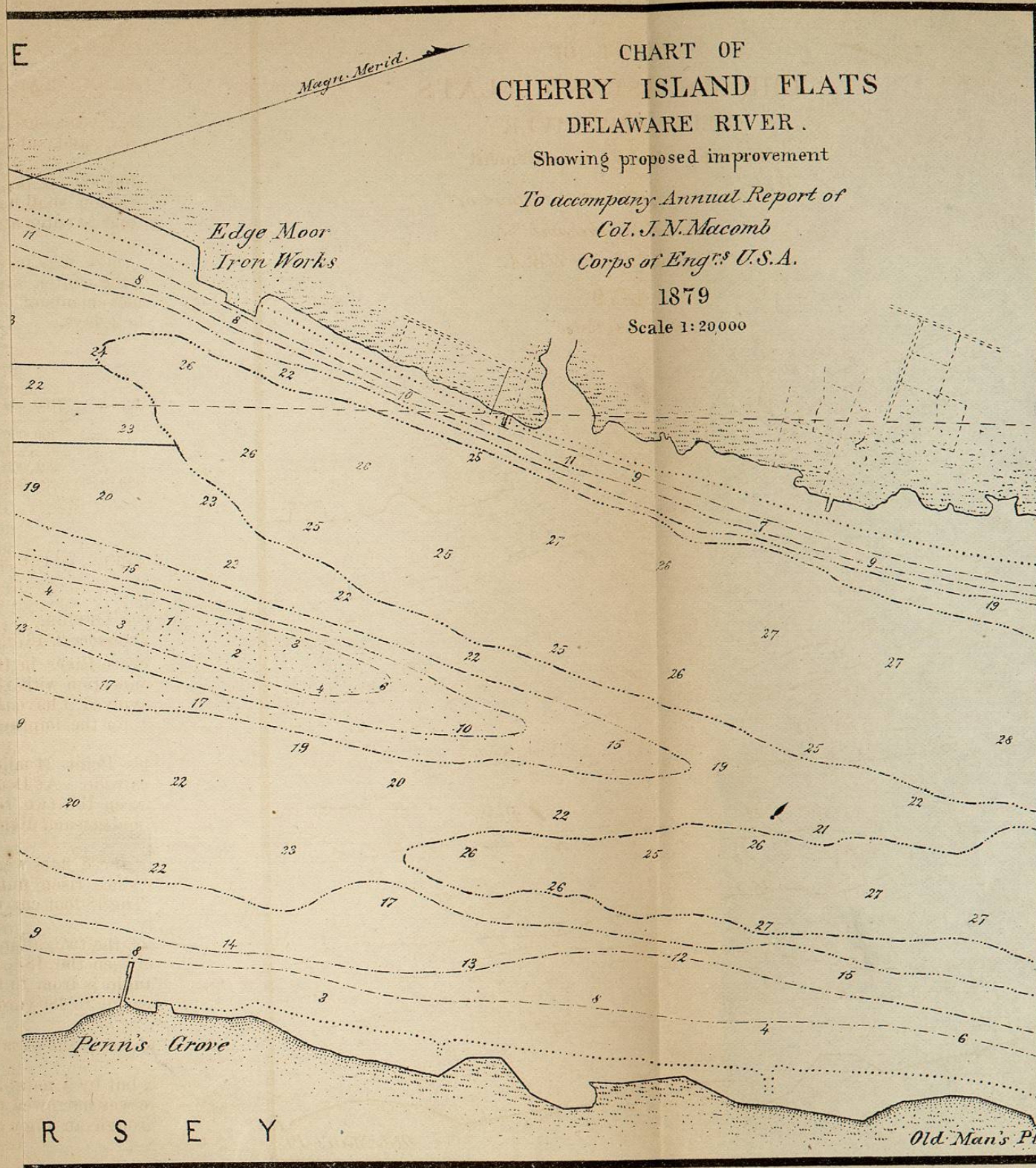
The Cherry Island Flats begin just below Old Man's Point, 24 miles from Philadelphia. At this point the river is 1½ miles wide. At Deep Water Point, 5 miles below, it is 1 mile wide. Between the two the width increases to nearly 2 miles, and the flats lie in mid-stream, dividing the river into 2 channels.

In 1842, as shown by the general chart of the river, these flats were covered with from 8 to 12 feet of water. They have since risen until over a considerable area there are now but 1½ feet. The 18-foot curve, however, occupies about the same position as formerly.

The eastern channel was in 1842 much the better of the two, affording a practicable draught of 20 feet, and a width between the 18-foot curves of from 300 to 600 yards. At present the draught is from 19 to 19½ feet, and the average width about 600 yards, decreasing to 480 yards at the narrowest place.

The distance between the 24-foot curves above and below the shoals has remained about the same, viz, 4,000 yards.

In 1842 the western channel had 19½ feet of water, but by a notable projection of the 18-foot curve from the western shore was narrowed to 150 yards for a considerable distance, and curved through an angle of



90 degrees. It was therefore not used by heavy vessels, which have continued ever since to run the eastern channel.

This projection, however, has since disappeared, and the western channel consequently exhibits a marked improvement. It is now over 500 yards wide at the narrowest place, with an average width of over 800 yards and a draught of $18\frac{1}{2}$ feet to 19 feet. The distance between the 24-foot curves above and below the shoals is about 3,500 yards.

This enlargement of the western channel is a significant and important change when it is considered that the increased capacity is entirely due to the action of natural causes, while all the benefit of the passage of large steamers with deep screws has been given to the eastern one. Notwithstanding this advantage the pilots represent that the eastern channel is again decreasing both in width and depth.

It is probable that these complaints are due rather to the greatly increasing size and number of the vessels which travel the river than to any rapid diminution in the capacity of the channel; but in any case the fact remains that the interruption to navigation caused by these shoals is yearly becoming more serious, and the demands for its improvement constantly increasing in urgency.

A survey of this locality was therefore begun early in the season, but discontinued when it was learned that the Light-House Board had perfected arrangements for having one made over precisely the same ground, with the view of determining the proper position for a new set of range-lights for the guidance of vessels past the flats.

The results of this survey are given on the accompanying chart copied from that furnished the Light-House Board, with the addition of the 24-foot curves and the lines within which it is proposed to make the necessary improvements.

The western channel is strongly indicated as the proper one to improve by the following considerations:

1. It is already much wider than the eastern, with but slightly less draught. It has gained this width from natural causes alone, and the use of the channel by heavy vessels will increase its depth. The eastern channel being abandoned will decrease to its former dimensions, and, continuing to deteriorate from disuse, an additional preponderance of natural scour will be gained for the western channel.

2. During the months in which ice runs in the river the prevailing winds are from the north and west, and the ice is therefore driven upon the eastern shore, leaving the western side comparatively free.

3. The main channel above the flats being on the west shore, vessels must in any case come to that side. The 24-foot curve at present forms a narrow loop in midstream, connecting the head of Cherry Island Flats with the lower end of Marcus Hook Bar, within which is a probably decreasing depth of but 22 feet to $23\frac{1}{2}$ feet, over which vessels must cross. There is, therefore, an additional obstruction on this route, and its improvement would ultimately involve maintaining a channel across the tide.

4. The actual amount of dredging that would be required to secure a channel of the desired width and depth would probably be about the same in either case, with the chances of permanence largely in favor of the western channel.

The question of lighting the channel being one closely connected with that of improving it, and the utility of a range that vessels can closely follow being very great in maintaining a channel of limited width, the particular line drawn on the chart was selected for common recommendation