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TREASURY DEPARTMENT,
Office of Commissioner of Customs, October 20, 1862.

SIR: In compliance with your requisition of the 2d instant, I have the honor to submit a report of the operations of this office during the fiscal year ending June 30, 1862.

The number of accounts of collectors of the customs, and of surveyors designated as collectors, received and finally settled in this office during the year, amounts to one thousand eight hundred and twenty-eight.

Accounts relating to the superintendence and construction of light-houses, beacons, buoys, marine hospitals, and custom-houses, and for other miscellaneous purposes, amount to one thousand one hundred and seventy-one.

The number of bonds taken from collectors, naval officers, &c., and the notices issued thereon, amount to one hundred and fifty-four.

In disposing of this amount of business, with other matters referred by the department, four thousand four hundred and fifty-seven letters have been sent from, and two thousand and ninety-seven received at this office.

In making this, my annual report, I would respectfully remark that, in looking over the records of my office and the official correspondence of my predecessors, I cannot but observe that a much greater variety of business was formerly referred to or came, *as a matter of course*, to this bureau, than has of late years been referred to it. I have only to say that I shun neither labor nor responsibility, and am ready at all times to take upon myself any and all labor formerly performed by my predecessors.

I have the honor to be, with great respect, your obedient servant,

N. SARGENT,
Commissioner of Customs.

Hon. S. P. CHASE,
Secretary of the Treasury.

M.

LIGHT-HOUSE BOARD.

TREASURY DEPARTMENT,
Office Light-House Board, Washington City, November 1, 1862.

SIR: I have the honor respectfully to submit for your information, and for that of Congress, the report of the operations and condition of the light-house establishment for the fiscal year ending June 30, 1862.

In the first light-house district, embracing the coasts from the northeastern boundary of Maine to Hampton harbor, New Hampshire, the board has, through the exigencies of the military and naval branches of the public service, been deprived of both a naval officer as inspector and an officer of the army as engineer. It has therefore been compelled to rely upon such civil assistance as it could command; yet it is believed the service has been faithfully performed, and the condition of the various aids to navigation throughout the district is highly satisfactory.

Thorough inspections of the district have been made, and important repairs and renovations have been effected at Isle of Shoals, Whale's Back, Portsmouth, Boon Island, Cape Elizabeth, Dice's Head, Franklin Island, Hendrick's Head, Martinicus Rock, and Moose Peak light-houses, and those stations are now in

good order. The buoy and beacon service has received due attention, and when, by casualties, these aids have been removed from their stations, they have been recovered and restationed as promptly as possible.

The second light-house district, embracing the coasts from Hampton harbor, New Hampshire, to Gooseberry Point, Massachusetts, has but recently had assigned to it an officer of the navy as inspector, previous to which assignment, and since the date of the last annual report, the duties have been discharged, under the immediate direction of the board, by civilians previously connected with the light-house establishment as light-house clerk and engineer's clerk.

Under this arrangement the various aids to navigation in the second district have been carefully looked after, and, it is believed, are now in a state of creditable efficiency.

Several of the light-vessels in this district have, during the past year, been driven, by stress of weather, from their stations. They have, however, been replaced as speedily as the delay necessary to make requisite repairs would permit. These accidents to light vessels and their replacement on their stations involve, in nearly every instance, an enormous expense, and this board makes it a part of its duty to cause careful investigations to elicit the facts of the accident, and in every instance where it is reasonable to believe that it is attributable to negligence or incompetence on the part of the keeper, the details of the case are promptly reported to the department, with a recommendation that the keeper be removed. Such precautions are taken to have the light-vessels securely moored that it is usually found that accidents of this character are mainly due to carelessness or inattention—sometimes to culpable timidity—on the part of keepers.

The buoyage and beaconage of this district have been well cared for. Extensive and thorough repairs, &c., have been made to the light stations at Ipswich, Straitsmouth, Bass harbor, Tarpaulin cove, Gay Head, Clarke's Point, Palmer's island, Ned's Point, Bird island, Long Point, Boston Narrows, Ten Pound island, Marblehead, Dumpling island, Newburyport, Annisquam, Egg Rock, Mayo's Beach, Long Island Head, and Hyannis. New beacons and day-marks, in place of others carried away by storm, have been erected at Monument Bar, Hardy's Rock, and Bowditch Ledge.

The third light-house district embraces the coasts from Gooseberry Point, Massachusetts, to Squam inlet, New Jersey, including Lake Champlain and Hudson river, and although for most of the time deprived, by the exigencies of the military department, of the services of a naval and army officer as inspector and engineer, yet the duties of the district have been carefully performed, and the various aids to navigation are in a state of high efficiency.

The two new towers at Navesink, which were under construction at the date of the last report, have been completed, and the lights exhibited on the 1st of May, 1862. This station now shows two fixed lights of the first order, and with a view to obviate an alleged tendency to confuse mariners by the risk of confounding the two fixed lights at this station with the two fixed lights on Sandy Hook light-vessel, one of the latter lanterns has been lowered some nine feet. This plan, it is hoped, will entirely remove the cause of complaint.

Extensive repairs to towers and keepers' dwellings have been made in this district, viz: at Juniper island, Burlington, Split Rock, Cumberland Head, Point au Roche, Windmill Point, Esopus Meadows, Rondout, Saugerties, Cox-sackie, Stuyvesant, Stony Point, Sandy Hook, Robbins' Reef, Bergen Point, Passaic, Faulkner's island, Execution Rocks, and Elbow Beacon.

The light-vessel at Sandy Hook was found to require extensive repairs. These have been made, and the vessel replaced in complete condition on her station.

The buoyage of the district has received due attention, and has been maintained in a condition of great usefulness.

There are numerous other works of repair required in this district, which will be attended to during the next season as rapidly and completely as time and other circumstances will permit.

In the fourth district, embracing the coasts from Squam inlet, New Jersey, to Metomkin inlet, Virginia, including Delaware bay and tributaries, the light-house service has been maintained in an efficient condition, with but slight expense for repairs and renovations, the most important work being the rebuilding, on a proper site, of the light-house at Mahon's river, which change had been rendered necessary by reason of defective original location, and subsequent encroachment of the water, imperilling the structure. These dangers have been entirely removed by the new position.

At Cape Henlopen light-house it has been found necessary to take measures for building a new dwelling for the keeper, the old one at that place being threatened with speedy destruction by the steady progress in that direction of a remarkable sand hill, which has been moving inflexibly in a certain course at a constant rate of speed for many years, presenting in its existence and movement a most singular natural phenomenon. The new dwelling is in course of preparation.

The old light tower at Cape May, which, upon the completion of the new light-house, had been left standing, having been found to be productive of danger, by misleading mariners by day, has been thrown down, and steps taken to dispose of the old materials.

The light-vessels, buoys, and beacons in the district are in a state of efficiency.

In the fifth light-house district, embracing the coasts from Metomkin inlet, Virginia, to New River inlet, North Carolina, including Chesapeake bay and tributaries, Albermarle and Pamlico sounds, the service has been to some extent interrupted, the authority of the United States not yet having been re-established throughout the entire district.

Since the date of the last report strenuous efforts have been made to restore discontinued lights, and in view of the numerous grave difficulties to be encountered the board has reason to congratulate itself upon the success which has attended its exertions.

Immediately upon the restoration of the eastern shore of Virginia to governmental control by the military operations in that quarter, the lights at Cape Charles, Chrystone, and Hog island were re-established, and have rendered assistance of no small importance to the immensely increased navigation of Chesapeake bay and tributaries. The lights, main and beacon, at Cape Hatteras have been restored and re-established. The light at Naval Hospital, near Norfolk, has been relighted. A temporary light has been exhibited from the ruins of the light-house at Craney island, and the work of permanently restoring that structure is in progress.

By authority of the department a vessel has been purchased and stationed off Smith's Point, in Chesapeake bay, to replace the light-vessel belonging to that station, which was removed and destroyed by the insurgents. Through the courtesy of the general commanding this department, a competent military guard for the protection of this vessel has been detailed for duty and is yet continued.

The light-vessel stations in the bounds of North Carolina have been marked by suitable vessels showing temporary lights, viz: Brant Island shoal, Royal shoal, Harbor island, Long shoal, and Roanoke river, and steps are now in progress for the early re-establishment of the light-house at Wade's Point, Croatan, Roanoke marshes, Pamlico Point, northwest point of Royal shoal, and Ocracoke.

The light-vessel which formerly marked Brant Island shoal, and which was recaptured on the taking, by the United States forces, of Forts Hatteras and Clark, at Hatteras inlet, was subsequently sunk by accident at that inlet. She

has, however, been raised, and is now undergoing repairs to fit her for service as a light-vessel.

The light-house at the mouth of the Neuse river, which was under construction at the time of the breaking out of the rebellion, was necessarily abandoned. The work has been recommenced, and is rapidly approaching completion.

By act of Congress approved June 20, 1860, an appropriation of \$5,000 was made for the erection of a beacon light at a suitable point at or near Cape Hatteras inlet. The requisite iron and wood work for this structure has been prepared at Wilmington, Delaware; a working party was sent to erect it; the materials were all safely landed at the site selected, and on the same night a storm of almost unparalleled severity swept them away, so that scarcely a vestige remained. Such of the materials as could be recovered (being such things as would be useful to the army) were sold to the quartermaster's department at Hatteras inlet, and the amount, together with the balance remaining of the appropriation, it is believed, will be sufficient to replace, in a measure, the lost structure.

Various and important repairs to light-vessels in the upper part of Chesapeake bay have been made, and are still in progress.

The buoyage and light-vessel service of the district, so far as it is practicable to attend to it, is in a condition of great efficiency. The light-vessel originally placed to mark the tail of the Horse Shoe, between Capes Charles and Henry, entrance to Chesapeake bay, was lost from her station during the storm in January last, and it was found necessary to place upon that station a vessel which the board had been refitting at Baltimore for another station. Measures have been taken to recover, with a view to future use, certain light-vessels which had been forcibly removed from their stations in this district, and sunk as obstructions to the channel in Elizabeth river, &c.

The lights on James river, at White shoal, Point of Shoals, and Deep Water shoal, were re-exhibited during the past summer; but, upon the withdrawal of the army from the peninsula, their services were no longer necessary, and the apparatus was taken down and stored at Fortress Monroe.

In the sixth light-house district, embracing the coasts from New River inlet, North Carolina, to Cape Cañaveral light-house, inclusive, Florida, but little has been done to replace lost or destroyed aids to navigation, in consequence of the larger portion of the district not yet having been brought under the control of the United States government. The care of this board will be to push forward such work of restoration parallel with the recovery of the territory.

The light-vessel stationed by the board off Port Royal entrance in place of the one destroyed by the insurgents, has been kept in position during the past year, and has proved of very material assistance to the numerous vessels bound into Port Royal and along that portion of the coast.

The seventh light-house district embraces the coast of Florida from St. Augustine to Egmont key. The lights in this district, with the exception of those at Jupiter inlet and Cape Florida, have been kept in useful operation during the past year, and the buoys have been carefully attended to.

Steps have been taken to have the light at Cape Florida relighted at the earliest practicable day.

The eighth light-house district, embracing the coast from St. Mark's, Florida, to the western extremity of Lake Pontchartrain, has not received so much attention from the board in the way of re-establishing lights and other aids to navigation (all of them having been removed or discontinued by the rebels) as had been desired, for the reason that the authority of the United States over that locality had not until recently been sufficiently established to warrant such action.

Steps have been taken to repair damage done to the lights at Ship island,

Cat island, St. Joseph's, Pleasanton head, Proctorsville, Rigolets, Bon Tonca, Port Pontchartrain, Bayou St. John, New Canal, Tchefuncti river, and Pass Manchac, and it is hoped and expected that by the 1st of January, 1863, all of these lights will be re-exhibited. The other lights and the buoys in this district will be restored as rapidly as circumstances shall warrant.

The ninth district, embracing the coast from the mouth of the Mississippi river to Rio Grande, inclusive, lying nearly entirely beyond the present control of the United States, has had but little done in the way of restoring aids to navigation. Chandeleur Island light has been kept in operation during the year.

The important light at South Pass has been repaired and relighted, and the no less important lights at Southwest Pass, Pass à l'Outre, and head of the passes, (mouths of the Mississippi river,) are in course of repair, preparatory to their immediate re-establishment.

In the tenth district, embracing all lights on the lakes Erie and Ontario, and rivers St. Lawrence and Niagara, the general routine duties have been performed with commendable zeal and fidelity, and the various aids to navigation are in a state of efficiency. Important repairs and renovations have been made, or are now making, at nearly all the light stations in the district requiring them, and the buoys and other day-marks have been the object of assiduous attention.

In the eleventh light-house district, embracing lakes St. Clair, Huron, Michigan, and Green Bay and tributaries, several important works of construction and repair have been in progress during the past year.

Under instructions from the honorable Secretary of the Treasury, the necessary steps have been taken for the immediate erection of the light-house at Green Bay, Wisconsin, authorized by Congress, March 3, 1859.

The light-house at Raspberry island, Lake Superior, for which an appropriation of \$6,000 was made March 3, 1859, has been pushed nearly to completion, and will be exhibited on the opening of navigation next spring.

The work of constructing light-house piers at Milwaukee and Racine has been delayed by reason of the failure on the part of the contractor for timber to make deliveries in such quantities as would warrant the commencement of the framing at either locality. The engineer in charge has, however, been directed to transfer the timber delivered at Milwaukee to the Racine structure, which will insure an energetic prosecution of the work upon that pier, preparatory to the erection of the beacon light.

The necessary surveys and examinations in advance of the commencement of works on other light-houses in this district, for which appropriations have been made by Congress, have been in progress.

The buoyage of the district has been well attended to, and has been of material assistance to the navigating interests of the locality.

In the twelfth light-house district, embracing the entire Pacific coast of the United States, the various aids to navigation have received careful attention, and have been maintained in an efficient condition.

The want of an appropriation for the expenses of the steamer provided for that district, for attending buoys, transportation of supplies, &c., has obliged this board to lay this vessel up, and her services being urgently desired by the revenue marine on that coast, by authority of the honorable Secretary of the Treasury she has been temporarily loaned to that bureau. The withdrawal of this vessel from light-house duty has occasioned serious embarrassment to this board on account of the great difficulty experienced in having the buoyage of the district properly attended to; but Congress at its last session having made an adequate appropriation for her support, it is expected that this branch of the service will be more thoroughly and completely controlled.

The difficulty attending the collection of reliable and detailed information concerning the status of the light-house establishment on the coasts of seceded

States over which the control of the United States has not been yet thoroughly re-established renders it impossible to submit an exact statement of damages done and repairs required, but the following list, as derived from all sources, official and unofficial, that appeared to be worthy of attention, will be found to be approximately correct.

Cape Henry, Virginia, tower standing, lantern destroyed.

Craney island, iron pile structure, destroyed, except foundation piles.

Naval Hospital, lens removed, light re-exhibited.

White shoals, Point of Shoals, Deep Water shoals, James river, lenses, &c., removed.

Body island, tower standing, lens, &c., removed.

Ocracoke, tower standing, lens, &c., removed.

Cape Lookout, tower damaged, lens, &c., removed.

Bogue Bank and beacon, blown up.

Cape Romain, lens and lantern destroyed.

Cape Hatteras, lens and lantern destroyed, light re-exhibited.

Bull's bay, lens and lantern destroyed.

Charleston, lens and lantern destroyed.

Hunting island, tower blown up.

Tybee, interior of tower and lantern destroyed by fire, lens, &c., removed.

St. Simon, tower and lantern destroyed.

Jupiter inlet, tower and lantern destroyed.

Cape Florida, tower and lantern destroyed.

All of the light vessels from Cape Henry southward, including the two in the Potomac river and those in Chesapeake bay, (except Hooper's straits and Jane's island,) have been removed and sunk or destroyed by the insurgents.

The buoys on the southern coast have, as far as learned, been nearly all removed from or sunk at their stations. Under the authority of the department, the necessary illuminating apparatus to replace that removed or destroyed as above has, with the approbation of the Secretary of the Treasury, been ordered from France, and upon receipt will be kept on hand for re-establishing the lights as possession of the coast is regained.

In view of the pressing need of re-establishing the light vessel stations discontinued by the insurgents, this board asked and obtained permission from the department to construct under contract, after due public advertisement, two first class light-vessels designed for Fryingpan shoals, coast of North Carolina, and Rattlesnake shoal, South Carolina, and three second class light-vessels intended for service at positions of less exposure, which are all under contract and in progress of construction.

The necessary illuminating apparatus and lanterns for these vessels have been ordered, and it is hoped and expected that the spring of 1863 will see them completed and on their proper stations.

The board takes this occasion to acknowledge valuable assistance rendered by officers of the Coast Survey, under instructions from the superintendent, in replacing certain buoys on the coasts contiguous to the operations of their own regular service, viz: entrance to Metompkin inlet, New Jersey; Oregon inlet, North Carolina; entrance to Neuse river, North Carolina; entrance to Charleston harbor, South Carolina; Stono inlet, South Carolina; North Edisto bar, South Carolina; St. Helena sound, South Carolina; Port Royal, South Carolina; Tybee roads, Georgia; Wassaw sound, Georgia; St. Simon's sound, Georgia; Southwest Pass of the Mississippi river, Louisiana, and Mare Island straits, California.

It is respectfully submitted that since July, 1861, this board has been without the services of an engineer secretary, and since the 7th June without those of a naval secretary.

The patriotic impulse which calls every true man to serve the country in her

hour of trial, and the field opened for distinction in the two branches of the military service, from which the law establishing the board directs that these officers shall be taken, has made it difficult, if not impossible, to withhold from the more exciting and imposing scenes of the camp or the ship young officers eligible and qualified for the useful but less brilliant duties of the desk.

Under these circumstances the chairman of the board, with the assistance of an executive committee, sanctioned by the president of the board, has, in addition to his own proper duties, discharged those appertaining to the naval secretary, and the member from "the corps of topographical engineers of the army" has been charged with the engineering duties.

It will be the endeavor of the board that the public service shall not suffer in consequence of this reduction of the force deemed proper by Congress for the due performance of the duties of the light-house establishment.

All of which is respectfully submitted.

Very respectfully,

U. K. STRIBLING,
For Chairman.

Hon. S. P. CHASE,
Secretary of the Treasury.

N.

COAST SURVEY.

STATION NEAR WEST CHESHIRE, CONNECTICUT,
November 5, 1862.

SIR: I have the honor to submit for your examination the estimates for the work of the Coast Survey for 1863-'64, and to request that, if approved, they may be inserted in your estimates of appropriations. They are adapted to the plan of working approved by you, by which all the aid possible is rendered by our organization to the operations of the army and navy, and the regular progress of the survey is carried on wherever protection can be had for them, or is not needed.

The amount of the estimates is but little more than half that of 1860-'61, and is much diminished from that of 1861-'62, as will be seen by the comparative table at the close of this letter. The items are the same as, or less than, those approved last year by the Executive and by Congress, with the addition of one for the pay of engineers of the Coast Survey steamers, not now provided, as formerly, by the Navy Department. The surplus of the year before last, from which these officers were paid in 1862-'63, will be exhausted during this fiscal year.

These estimates will enable us to continue the regular work of the survey wherever our parties can move freely; to continue steadily all the office-work, on, however, a reduced scale, so as to work up all the information already collected, and to place it in appropriate and simple form in possession of the officers of our government, civil, military, and naval; to give important aid, by charts and by the personal experience of our officers, to the fleets and expeditions upon the coast; to revise the surveys in localities known to be changeable; to collect new information by reconnaissance on shore or afloat, and to keep up the essential organization of the survey, which has, by the testimony of the most enterprising naval and military officers, proved itself so valuable. The statements of the use made of the Coast Survey parties in different important military and naval expeditions will be given in my annual report, with the acknowledgments made

Painters and paint.....	\$20,534 66	
Labor.....	33,802 43	
Teaming.....	7,242 60	
Contingent pay-roll.....	34,476 94	
		<u>\$305,183 79</u>

Amounts expended from construction funds by order, and to be refunded :

Furniture.....	12,958 27	
Cabinet-maker's work.....	43,776 68	
Work for note bureau.....	5,264 60	
Floor-cleaning.....	2,526 09	
Night-watch.....	36,012 50	
		<u>100,538 14</u>

Disbursements made.....	985,508 04
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P.

TREASURY DEPARTMENT,

Office Light-House Board, Washington, October 31, 1863.

SIR : I have the honor respectfully to submit, for your information and for that of Congress, the report of the operations and condition of the light-house establishment for the fiscal year ending June 30, 1863.

In the first light-house district, embracing the coasts from the northeastern boundary of Maine to Hampton harbor, New Hampshire, the general condition of the service gives evidence of faithful performance of duty on the part of the employés.

As complete inspection and renovation of the light-stations of this district have been made as time and opportunity would permit, and it is believed that but little is required to entirely complete the system of repairs.

The walk connecting the Portsmouth light-house with the shore having been removed to facilitate operations on the fortifications at that place, it has been replaced by the engineer department.

The fog-bell rung by machinery, authorized by act of Congress March 3, 1859, for Whale's Back light-house, has been erected, and is now in successful operation. Various and important repairs have been made at Boon island, Goat island, Wood island, Cape Elizabeth, Portland Head, Breakwater, Burnt island, Manheigin, White Head and Owl's Head light-houses. The beacon heretofore placed on Logey ledge having been overthrown, measures have been taken for its re-erection. Similar steps have been taken to replace the beacon on Lower Middle ground in Lubec bay, which had been thrown down, and it is hoped that both of these important aids to navigation will be in position soon after the opening of the next working season.

The buoyage of the district exhibits a gratifying condition. Through stress of weather and other causes, numerous buoys have been driven from their station, but they have been replaced with commendable alacrity.

The necessity for re-buoyming the approaches to Portland harbor has led to the mooring of the following new buoys: 1st class can (iron) on Hue and Cry rocks; 2d class nun (iron) on Vapor rock; 3d class nun (iron) on Taylor's reef; spar buoy on Catfish rock.

The tenders in this district have been kept constantly and usefully employed, and one of them was sent to Beaufort, South Carolina, laden with the materials

for constructing the range lights authorized by Congress for Port Royal entrance, the structures for those lights having been framed and fitted in this district.

The second light-house district embraces the coasts from Hampton harbor, New Hampshire, to Goosberry inlet, Massachusetts.

The different aids to navigation in this district have received careful attention during the past year, and their condition is as nearly complete as practicable.

Extensive and important repairs have been completed at the following stations: Hyannis, a new cast-iron lantern has been erected on a brick parapet, tower lined, platforms repaired, &c.; Chatham, the southerly tower partly rebuilt, new lantern provided, new floor to watch-room, woodwork repaired; Long Island Head, new floor to watch-room, roofs, bridges, &c., repaired; Nobsque Point, new lantern provided, woodwork renewed, and outside shutters placed; Sandy Neck, woodwork renewed, platforms renewed, bulkhead repaired; Billingsgate island, cistern renewed and general repairs made; Brant Point, new floors, wharf, &c., repaired, tower repointed; Nantucket Cliff beacons, platforms renewed, enclosures repaired, &c.; Sankaty Head, tower repointed, chimney partly rebuilt, &c.; Great Point, fences, platform, and steps renewed; Plymouth, general repairs made; Cape Cod, ditto; Nansett Beach, tower repointed, new bulkhead built, out-buildings repaired; Race Point, tower partly taken down and rebuilt, new lantern provided, woodwork renewed, kitchen lathed, plastered and newly floored, roofs repaired, chimneys partly rebuilt, grounds graded, &c., fog-bell removed to a position nearer the dwelling; Boston Narrows, this structure, which had been run into by a vessel and materially damaged, has been repaired in iron and wood work, new ladder and tackle supplied; Cape Page, chimneys rebuilt, shutters provided, cistern repaired, painting, &c.; Palmer's island, new lantern provided and small repairs made; Dumpling Rock, new lantern provided, platforms renewed, &c.; West Chop, new lantern supplied, &c., new rain gutters provided, tower, &c., repointed; Bird island, new lantern erected, sea-wall repaired, planking of pier renewed. Repairs at Wing's Neck light-house, including the erection of a new lantern, are in progress. All of the light stations in this district have been thoroughly inspected, and each, except Edgartown and Clark's Point, is now fitted with a suitable lantern of approved construction. The illuminating apparatus has been thoroughly overhauled and repaired.

Repairs are yet required at Cuttyhunk, Cape Ann, and Gay Head light stations, which will receive due attention during the next season.

The several light-vessels of this district have been continued on their stations almost without interruption during the year—a fact in itself most gratifying, and demonstrating, moreover, the advantage due to rigid inspection by the board, and responsibility attaching to keepers who fail to comply strictly with the regulations. The buoyage and beaconage is in an effective condition, and seems to meet every requirement of commerce.

The large quantities of oil and other supplies for the entire establishment are mostly provided in or distributed from this district, which duty, involving much attention and carefulness, has been promptly and satisfactorily performed.

The duties of the third light-house district, which embraces the coasts from Gooseberry Point, Massachusetts, to Squam inlet, New Jersey, including Lake Champlain and Hudson river, have been carefully performed, and the various and highly important aids to navigation within its limits are in a condition of great usefulness. They have been brought under frequent and searching scrutiny, and the good effects are seen in their increased efficiency.

The dwellings for light-keepers at Navesink have been completed, and the new station and structures present a highly ornate and substantial appearance. The board has heard no complaints on the part of mariners of the confounding of these two fixed lights with those on Sandy Hook light-vessel, as was appre-

hended. The change of light at this station is believed, therefore, to have been followed with none but useful results.

The light-house tower at Sandy Hook and the West beacon at that place have been thoroughly renovated, a new boat-house built, &c.

The light-house at Princess bay was found to be in such a condition as to make its reconstruction a matter of necessity, admitting of no delay. The work of rebuilding it is now in progress and will be pushed forward to early completion, a temporary frame to secure the exhibition of the light during the work having been erected. Measures have been taken to insure the protection of the site from the erosive action of the water by the construction of crib-work piers.

Important repairs have been made to the light stations at Robin's Reef and Sand's Point, new lanterns having been provided for both.

The artillery practice at Fort Tompkins having seriously damaged the lantern glass of the light-house at that place, refitting was found to be necessary.

Repairs more or less extensive have been made at the following light stations: Bergen Point, Passaic, Point Comfort, Waackaack, Conover, Stony Point, Four Mile Point, Saugerties, Stuyvesant, Cocksackie, North Dumpling, Morgan's Point, and Plum island.

New dwellings for keepers have been provided at New London and Juniper island light-house stations.

A new wooden spindle, surmounted by a cage, has been erected at Southwest Ledge to replace one carried away by ice.

The spindles at Cow island and Cocoyman's bar were both destroyed by the ice last winter, but have been replaced during the year by new ones.

The beacon at Race rock having been thrown down, steps have been taken for its re-establishment, and no time will be lost in completing the work.

The light-vessel at Bartlett's reef having been found in an unsafe condition, was removed from the station for repairs, which a careful examination found indispensable. These repairs were extensive and involved much expense, but the work was faithfully done, and the vessel, substantially new, is again on her station.

The other light-vessels in the district have received careful attention and have been kept constantly on their stations.

The vessels now marking Stafford shoals and Eel Grass shoal are old, and need such extensive repairs that it has been deemed advisable to submit a special estimate of appropriation required in each case. The general appropriation for this branch would probably prove insufficient to carry so heavy an expense.

The buoyage of the district is in a most satisfactory condition. The buoys have been kept under watch as far as possible, and when through casualty any have been lost, they have been promptly recovered and replaced. The loss of material has, during the past season, been rather less than usual.

Pending the construction of a beacon for Race Rock, a first-class iron buoy has been placed to mark that danger. This buoy thus far answers the demands of commerce, but it may be expected that at that exposed point the drifting ice will, during the coming winter, drag it from its station.

The bell buoy which formerly marked Shagwong reef has been renovated and prepared for service.

The condition of the various aids to navigation throughout this district is generally efficient, but there still remains much work of renovation to be done, to meet the larger expense of which special estimates of appropriation will be submitted.

The fourth district embraces the coasts from Squam inlet, New Jersey, to Metomkin inlet, Virginia, including Delaware bay and tributaries.

The aids to navigation within its limits have been maintained in an efficient condition and with but few unusual casualties or expenses.

Repairs have been made at Barnegat, Absecon, Cape May, Fort Pier, Chris-

tiana, Reedy Island, Bombay Hook, Delaware breakwater, and Cape Henlopen light stations.

At Cape Henlopen a new dwelling for the keepers has been completed in a position calculated to avoid the course of the large moving sand hill at that place. The sites of the light-houses at Cohansey and Egg island having been found to require considerable protection, the amounts necessary to complete the works have been asked for in a special estimate.

The Five-Fathom Bank and Cross Ledge light-vessels have undergone extensive repairs, found to be necessary, and are now in good condition.

The buoyage of the district has received careful attention, and is in a state of efficiency.

In the fifth light-house district, embracing the coasts from Metomkin inlet, Virginia, to New River inlet, North Carolina, including Chesapeake bay and tributaries, Albemarle and Pamlico sounds, circumstances have not permitted the board to make many improvements beyond those mentioned in the last annual report.

The new illuminating apparatus ordered for Cape Hatteras main light, combining the latest and highest improvements, has been placed in its position, and various repairs to this station have been completed during the year.

The light-houses at Roanoke marshes, northwest point of Royal Shoal, Croatan, Cape Lookout, and Ocracoke have been refitted and the lights re-exhibited.

The light-house at Wade's Point was also re-established, but early in May last it was visited by a guerilla force from the main land and again destroyed.

A new light-house has been established at the mouth of Neuse river, showing a fixed light of the 5th order, and a 500-pound bell, to guide mariners during foggy weather, has been provided and put in operation.

The light-vessel stations at Long shoal and Brant Island shoal have been marked by suitable vessels and apparatus, and are now in effective operation. The vessel marking the latter station being old and defective, measures are in progress for the erection at that site of a screw-pile structure, and it is confidently expected that in the course of the coming winter the new light will be completed.

The light-houses at Craney Island shoal, Back river, and Cape Henry have been repaired, renovated, and refitted, and are now in operation, the important light at Cape Henry being protected from the enemy by a military guard detailed by the general commanding at Fortress Monroe.

Upon the exhibition of Cape Henry light-house, the light-vessel placed at the tail of the horseshoe to facilitate entrance into Chesapeake bay, during the extinction of that light-house, being no longer necessary, was discontinued and removed.

A new fog-bell, frame, and machinery has been placed at Old Point Comfort light-house, and extensive general repairs made at that station.

Important repairs have also been made at Watt's Island, Fog Point, Point Lookout, Piney Point, Blackiston's Island, Bodkin Point, Fishing Battery, and Lazaretto Point light stations.

It having been deemed necessary to establish a depot in this district for light-house property and supplies, the old wharf at Lazaretto Point, which had been for many years unfit for service, was reconstructed, and the large warehouse at that point belonging to the Treasury Department having been placed at the disposal of the board, was repaired and refitted, and will now afford to the operations of the light-house establishment the greatest facilities.

A fog-bell, to be rung by machinery, authorized at the last session of Congress, for Sandy Point, Chesapeake bay, Maryland, has been completed and put in operation.

The light-vessels in this district have received careful attention, and with but one or two exceptions have remained securely at their stations. The light-

vessel built under contract for Frying Pan shoals, off Cape Fear, North Carolina, has been sent to her station, but the lights have not been exhibited in compliance with the wishes of the naval authorities.

The buoyage has likewise been cared for, and is in a condition of great usefulness. Beaufort bar and Hatteras bar, North Carolina, have been systematically and properly re-buoyed.

In the sixth light-house district, embracing the coasts from New River inlet, North Carolina, to Cape Canaveral light-house, Florida, inclusive, the same reason which called for a brief summary of operations in the last annual report still exists, *i. e.*, the slow recovery of the territory by the United States military forces.

Congress, at its last session, having made an appropriation for the establishment of range lights to facilitate the entrance into Port Royal harbor, early measures were adopted to secure the designed end. The necessary preliminary examinations were made, the plans and estimates of the engineer approved, and the construction of the buildings completed at Portland, Maine. When ready they were sent out to Port Royal and put up. These ranges consist of two lights on Hilton Head island, one light on Bay Point, and a light-vessel anchored on Fishing Rip. Through the courtesy of the general commanding the United States forces at Port Royal, the necessary details of soldiers were made to assist in opening a vista through the woods for the inner range on Hilton Head, and by the kindness of the admiral commanding the South Atlantic Gulf squadron, a suitable vessel for Fishing Rip was placed at the disposal of the board. These lights have been completed and lighted, to the great benefit of the increasing commerce seeking that port.

Early in the year a competent engineer was sent to this district to make, as far as possible, a detailed examination into the condition of the light-houses, &c., on this coast, and the damage done by the enemy thereto. He performed the duty confided to him with marked promptitude and ability, and his report conveys the intelligence that the following named lights have been more or less completely destroyed:

St. Helena sound light-house, blown up.

Hunting Island, undermined and thrown down.

Combahee Bank light-vessel, removed and burnt.

St. Simon's Island light-house, blown up.

Wolf Island beacons, blown up.

He reported the almost total destruction or removal of the buoys by the enemy, and a large number of suitable sizes and kinds, with the necessary accessories, was promptly forwarded from the buoy depots of the north. Upon their arrival at Port Royal they were, as far as required, placed in position under the direction of the officers of the Coast Survey on duty on that station.

In addition to the light-vessel for Fishing Rip, placed at the service of the board, the kindness of Admiral DuPont secured the services of a small schooner, a prize to the naval forces, as a tender for the district. She has been officered, manned, and placed in commission, and has proved of the greatest possible assistance in the performance of various works in the district, such as buoyage, transporting materials, supplies, &c.

The seventh light-house district embraces the coast of Florida from St. Augustine to Egmont key. The lights in this district have been maintained in useful operation.

Cape Florida light has not been re-exhibited. The necessary materials for its repair, and a suitable illuminating apparatus to replace the one destroyed by the enemy, have been provided and stored at Key West, so that the work may be prosecuted to early completion whenever it may be found safe and prudent to do so.

The eighth and ninth light-house districts have received the especial atten-

tion of the board, and in view of the many serious difficulties to be overcome in the re-establishment of the various aids to navigation, it has reason to congratulate itself upon having accomplished so much.

The important light at Pensacola has been repaired and re-exhibited, showing temporarily a fourth order, instead of the first order lens, which is allotted to that station, and the placing of which is not deemed advisable until the occupancy of a greater portion of the surrounding country by the United States forces shall have placed the station beyond risk of damage and spoliation.

Extensive repairs to the light-house at Ship Island (whose re-establishment was stated in the last annual report) have been made, and further needful renovations are in progress.

The screw-pile structure at Merrill's Shell Bank was found in measurably good condition. A new illuminating apparatus was provided, the necessary repairs made, and the light re-exhibited.

Pleasanton's island light-house has been repaired, refitted temporarily, and the light exhibited.

West Rigolets light-house has been repaired temporarily, and the light re-established.

The light-houses at Port Pontchartrain, Bayou St. John, and New Canal have been refitted and the lights put into operation.

Pass à l'Outre light-house has been thoroughly repaired, a new keeper's dwelling erected, and the light exhibited.

The old light-house at the head of the Passes was burned at the commencement of the rebellion. A new structure has been erected, and the light shown.

South Pass and Southwest Pass lights have been renovated, extensive repairs being made to the latter, and the lights re-exhibited.

The buoyage of the district has been well cared for as far as practicable, and a large lot of buoys is now on the way from the north, to further assist in re-establishing the admirable system which was in operation at the beginning of the war.

The tenth light-house district embraces all lights on Lakes Erie and Ontario and rivers St. Lawrence and Niagara. The various aids to navigation are generally in good condition, but few extensive repairs being required.

During the past year, important needful renovations have been made to the light stations at Green Island, Genesee, Galloo Island, and Huron.

Congress, at its last session, having made an appropriation for range lights for Maumee bay, Ohio, the necessary steps for prosecuting the work have been taken.

The buoyage of the district has received due consideration, and the numerous buoys have been maintained nearly constantly in their positions.

The eleventh district embraces Lakes St. Clair, Huron, Michigan, and Superior, Green Bay and tributaries. Several important works in this district, the commencement of which was reported last year, have been completed. Raspberry Island, one of the Apostle group, Lake Superior, has been marked by a light, and the new light-house at Green Bay, Wisconsin, has been completed and lighted.

The delivery of timber required for the construction of the light-house piers, authorized by act of Congress, for Racine and Milwaukee, has been so tardy on the part of the contractors, that but little progress has been made towards the completion of these highly important works. Various causes have been alleged for this failure, chief among which is the scarcity of labor, &c.

Measures have been taken to effect certain extensive and needed renovations at Beaver Island, Ports du Morts, Skilligalee Detour, Whitefish Point, Manitou and Chicago light-houses, which, when finally completed, will add much to the efficiency of these aids to navigation.

Upon an examination of the light station at Waugoshance, it was found that

this structure is threatened with destruction from the action of the lake, during storms, upon the crib-work foundation upon which it is built. The expense necessary to obviate the evil by building a new breakwater, &c., is so heavy that the limited appropriation under the head of "repairs, &c., of light-houses," was found to be totally unable to defray it. A special item to meet this object is, therefore, inserted in the estimates of appropriations to be submitted to Congress.

At its last session, Congress made an appropriation for repairs of the pier and beacon light at Kenosha, Wisconsin. The engineer has been directed to push forward the work to early completion, and it is now in progress.

The tender heretofore in service in this district having, through age and usage, become unserviceable, a new vessel has been provided and properly fitted.

The buoyage of the district has been well attended to, and a rock reef off Racine, Wisconsin, has been suitably marked.

In the twelfth light-house district, comprising the entire Pacific coast of the United States, but little has been done beyond the maintenance in an efficient condition of the existing aids to navigation.

At the last session of Congress an appropriation was made for the establishment of a light at Ediz Hook, False Dungeness bay, Straits of Fuca, Washington Territory. The land for the site having previously been secured by reservation, the engineer was instructed to take steps for the early exhibition of a suitable light—a temporary light having been established on the point and maintained by private enterprise. It is hoped that the permanent light will be in operation early in the next spring.

The progress of the fortification works at Fort Point, entrance to San Francisco bay, having rendered the removal of the light-house and fog-signal at that point imperatively necessary, steps have been taken to remove the light to a position over the stairway of the fort, and the fog-signal to a point outside the work near the two-gun battery. The work is now in progress, and the new tower, together with suitable quarters for the keepers, will, it is hoped, soon be completed.

Considerable difficulty has been experienced and expense incurred in the district, by reason of the fact that gold and silver is the only currency of that coast, and payments in the legal currency of the government are subjected to heavy depreciation. The cost of the establishment on this coast has, in consequence, been materially increased.

Congress, at its last session, made an appropriation of \$50,000 for the purchase of a lot and the erection of suitable buildings thereon for the light-house establishment in New York city or vicinity. Immediately upon the passage of this law, energetic steps were taken to secure an eligible site for this depot, and a number of lots were examined with a view to a selection. None suitable were found, however, which could be procured within the sum available. At this juncture the Hon. Secretary of the Treasury offered to place at the disposal of the board a portion of the lot belonging to the department on Staten island, near Castleton, N. Y. This lot is highly eligible in many respects, of suitable extent, accessible, and with a good water front. To render it available for the purposes required, considerable grading and filling and the construction of landing piers is necessary. The sum of \$32,000 of the appropriation has therefore been applied to the improvement of the lot, reserving \$18,000 for the construction of suitable buildings on that part allotted to the board. Plans and estimates for these buildings have been under consideration, and the work of erection only awaits the construction of proper facilities for landing materials, &c.

In August last the light-house at Cape Charles was visited by a party of guerillas, who completely destroyed that light; carrying away such portable articles as they deemed valuable. The new tower authorized for that station

had, at the breaking out of the rebellion, progressed in construction to a height of 83 feet; the greater part of the materials to complete the tower to its proper height (150 feet) being on the ground, stored, ready for future use. During the rebel occupancy of this part of the peninsula the articles which had been thus stored were subjected to indiscriminate pilfering and spoliation, so that a new provision will have to be made. It is the earnest desire of the board that means may be provided for the resumption of work at this highly important station as early as possible.

Wade's Point light-house was visited in like manner, and the wooden superstructure entirely burned. This light had been re-established under the assurance that its continuance would be secured by military protection, and, having been destroyed, the board does not deem its reconstruction advisable until it can be maintained beyond peradventure.

Of the five light-vessels which were under construction by contract at the date of the last annual report, two have been completed to the satisfaction of the board, and sent to the stations for which they were designed. The others, after great delay on the part of the contractor, were finally finished in July last, were paid for, and turned over to the agent of the board to receive certain necessary outfits. Whilst this work was in progress the vessels were seized at the wharf, in New Bedford, by the sheriff of that county, under a warrant to secure claims for labor and materials on them, due and unpaid by the contractor, and they are still in the possession of that officer.

This unusual and unlooked-for event deprives the government of the services of vessels to mark certain obstructions to navigation in the Potomac river; the want of which is the source of a heavy expense to the government, for the reason that the immense number of vessels chartered to carry supplies, &c., for this military department, are obliged, on arriving at these obstructions toward nightfall, to come to anchor until the next day.

The case is before the supreme court of Massachusetts, by whom a decision, it is expected, will be made in a few days.

A contract has been entered into, on terms highly advantageous to the government, for the construction of a large number of iron buoys of the several classes and sizes, for use in the waters south of the capes of the Delaware, and another contract for similar buoys of wood, for service in northern waters, where the absence of the "Teredo navalis" renders their use admissible. These buoys are in course of manufacture, and when completed will go far to replace the vast number of these aids to navigation destroyed or removed by the enemy at the beginning of the war.

Under authority of the department a contract has been entered into whereby the government derives a valuable consideration for allowing an excavation to be made for iron ore known to exist on the light-house grounds at Lazaretto Point, near Baltimore, Md. The preliminary excavations have been made, and it is supposed that the ore will be reached in large quantities in the course of a few weeks. In drawing the contract a provision has been inserted to secure the light-house grounds from any injury in consequence of the excavation.

Through the kindness of the Navy Department the board has had the advantage of the services of officers of the navy of high rank as inspectors in the 2d, 3d, 4th, 5th, 10th, 11th, and 12th districts; and it is with great pleasure that it acknowledges the benefit derived to the public service from the experience, ability, and zeal which those officers have brought to the discharge of their duties. It is hoped that it may comport with the arrangements of the Navy Department to continue this kindness, and to extend it so that all the districts may be so supplied.

The act of Congress approved August 31, 1852, assigns this duty to "officers of the army or navy," and at the first arrangement of the district they were equally divided between the two branches of the service, and the able assistance

received from officers of the army, so long as they could be obtained, is gratefully acknowledged; but the demand for them to fill more appropriate and, no doubt, more congenial duties soon deprived the board of them, and five districts are now, and have been for some time past, without inspectors.

The same act of Congress further provides for a detail of officers of the engineer corps "to prepare plans, drawings, specifications, and estimates of cost of all illuminating and other apparatus, and for construction and repair of towers, buildings, &c., connected with the light-house establishment;" and further provides "that all works of construction, renovation, and repair shall be made by order of the board, under the immediate attendance of their engineer secretary, or of such engineer of the army as may be detailed for that purpose."

Experience has taught that the engineer secretary of the board cannot give "immediate attendance" to the construction, renovation, and repair of works without leaving important office duties unperformed, and that the board cannot hope to obtain from the engineer corps a sufficient number of officers to give both inspectors to districts and superintendents of constructions, renovations, and repairs. It is difficult to obtain them even for the latter purpose, for which they are most needed.

It is for the above reasons proposed that the inspections of all the districts (twelve in number) be given to navy officers, and the superintending of building, renovation, and repairs to officers of engineers of the army.

The light-house service suffered a severe loss in the death, on October 15 last, of Commodore William L. Hudson, inspector of the 3d district. This lamented officer had recently entered on his duties, but had already given assurance, by cheerful, zealous, and efficient action, that the high reputation which he had acquired in various other important stations would be enhanced in this new sphere of usefulness.

There being several specific appropriations for light-house purposes on hand in the treasury, which have not been used for want of sufficient information as to the localities, and the attention of the board having been drawn to the increased and increasing commerce on the upper lakes, and the consequent call for further aids to navigation on these important inland seas, a committee of two members of the board was detailed, with directions to visit certain localities on the seaboard and on the upper lakes with a view to the judicious expenditure of appropriations on hand and the obtaining of such information as will enable the board to ask understandingly for such additional specific appropriations as the daily increasing and important commerce of the northwest calls for. The report of this committee, which accompanies this, is respectfully submitted for consideration. It will be followed by further information from the same source, which will be duly laid before the department.

The board have from the first made it an object of primary importance to render the system of lighting the coast of the United States as perfect as possible, and their efforts in respect to this object have been crowned with more success than could have been reasonably expected from the great extent of our seaboard and the difficulties connected with many of the points to be illuminated. They have successfully introduced the lenticular apparatus at all the stations, and have thus added greatly to the efficiency and economy of the lights.

No sea-coast in the world can be compared in extent with that of the United States, and but few can now compete with it in the character of its lights. While this is manifest to the mariner, the reduction of the cost of maintenance of lighting has not been equally evident to the casual observer, since the average annual appropriation has not been diminished. But this has been caused by the large number of new stations which have been established, and the constantly advancing price of sperm oil, the principal material of the illumination. The price of this oil, which in 1852 was \$1 30 per gallon, had increased up to the time of the last purchase to \$2 43½ per gallon. The continued advance

in the cost of this material has been an object of constant solicitude to the board, and they have anxiously endeavored to avail themselves of any discovery or improvement which might offer a substitute for so expensive a combustible. With this view, a few years ago they imported from Europe a quantity of rape seed, which they distributed gratuitously through the Patent Office, and from which colza-oil is now being cultivated in several of the western States.

During the present year 6,000 gallons of this oil have been purchased for light-house use, principally on the western lakes.

It appears from photometrical measurements, made in Europe, that the light from colza is about $5\frac{1}{2}$ per cent. superior in intensity to that derived from sperm oil, while the quantity consumed is about $1\frac{1}{2}$ per cent. greater. Its practical value for the production of light is, therefore, about the same as that of sperm oil, while its cost is nearly one-half less. Were a sufficient quantity of this oil produced in the country, a great saving of expense would result from its general introduction; but this is not the case, and the board some time since directed experiments to be made, relative to the introduction of lard and petroleum oil; they were, however, unsuccessful. The lard oil did not stand the usual adopted test of congelation and burning in the ordinary trial lamp; and the petroleum, when first brought to market, was too volatile and combustible to be safely employed for light-house purposes. During the past year a new series of investigations have been made relative to the last-mentioned oils, by the committee on experiments, in person; from this it is expected, with considerable confidence, that lard oil may be economically substituted for spermaceti oil, in light-houses of all denominations; its photometrical power is slightly greater than that of sperm oil, while the quantity consumed is but little increased. It is true that it congeals with less degree of cold, and on this account, at first sight, might appear not to be as well adapted to our northern coast in winter, but the committee have found that during its combustion it evolves a greater amount of heat, both of radiation and of conduction, than an equal quantity of sperm oil, and may, therefore, apparently be made to retain its fluidity at a lower temperature.

After an elaborate series of experiments on the relative qualities of this oil, and the means of testing its purity, and after having studied its peculiarities while burning in lamps of all the different orders now used on the coast, the committee have put it to the test of actual use in a light-house of the first order, and thus far the experiments, which are still continued, have been entirely satisfactory.

The committee, however, do not as yet venture to pronounce with absolute certainty as to its general introduction, since this will depend on the amount of supply of the oil of a suitable quality, and, perhaps, on other contingencies not now apparent; they are, however, confident that through its means an important reduction can be made in the cost of the materials of illumination.

A series of experiments have also been made with kerosene oil, a material which they have found of much more difficult management than lard oil, but which, they think, may be introduced into the lower order of lamps, provided some changes are made in the parts of the apparatus at which the combustion takes place. All changes in the system or materials of lighting are, however, required to be made with great caution, since they involve the serious responsibility of the risk of life and property.

The board avails itself of this occasion to acknowledge valuable assistance received from the War and Navy Departments and the Coast Survey.

I am, very respectfully,

W. B. SHUBRICK,

Rear-Admiral, Chairman Light-house Board.

Hon. S. P. CHASE,

Secretary of the Treasury

LIGHT-HOUSE BOARD,

Treasury Department, October 25, 1863.

The committee to which was assigned the duty of visiting certain places on the northern and western lakes, and in New England, for the purpose of determining the necessity for certain lights and buildings in those places, has the honor to submit the following report.

The committee turned its first attention to the lights on the lakes, regarding them as the least accessible, particularly on account of the lateness of the season; and it will confine itself, at present, to communicating to the board the information concerning these lights, specially required by the letter of instructions of the chairman, of August 20, taking them up in the order in which they are mentioned in that letter.

I. Mission point, or the north point of the peninsula dividing the two arms of Grand Traverse bay.

The committee recommends the adoption of this light. It appears from the notes of Colonel Graham, furnished to this committee, that there is an extensive trade in the two arms of this bay, the coasts and back country of which are quite thickly settled. At the heads of both these arms there are excellent harbors and good anchorage, and vessels should be aided in reaching them. At their very heads at least three fathoms of water are found, and below from four to twenty fathoms.

The trade in both now consists of lumber, amounting to about eighteen millions of feet, of 10,000 cords of wood, of \$100,000 worth of furs, and \$50,000 worth of agricultural products, per annum, altogether about \$378,000 per annum. Traverse City, situated at the head of the west arm, is the terminus of an extensive railroad, which will probably be completed within two years. The land is private, and it is understood that it can be obtained on reasonable terms.

II. A light-house on Bertraw bay.

This site was examined to settle this question, in August, 1861, by Captain, now General Meade, the superintendent of the lake surveys.

From this examination it appears that Bertraw bay is merely an indentation in the land on the west shore of Green bay, about four and a half miles from Menomonee river.

Light-houses are required either for local or for general purposes.

There is no object of a local character in the proposed light-house, since the position is without trade, manufacturers or inhabitants; and for general purposes the question has already been settled by the erection of a light on Green island, opposite to Bertraw bay. This light is nearly if not quite completed; and if not lit now, will be very soon.

III. One or two beacon-lights at the entrance of Grand Traverse bay and harbor.

There is, at present, a light on the northern extremity of Grand island, which is simply a coast light, and suited to serve the general purpose of navigating the southern shore of the lake.

The question before us now is, whether lights shall be established for local purposes, and especially for the purpose of bringing the harbor of refuge at the bottom of the bay into convenient use. It will be very easy to satisfy the board that not only one but three lights should be erected in this vicinity.

There are two harbors at the bottom of the bay, well sheltered and affording good anchorage for vessels of all size. One of them is on the south side of Grand island, and the other is opposite, on the main land.

There are five entrances both on the east and west side, but both of these

entrances must be lighted to make them secure; and the lights on the west entrance should be so placed as to afford a range both by day and night.

From the southwest end of Grand island a plateau of shoal ground makes out, which is dangerous to vessels turning into the bay; and on the east entrance there is a similar shoal making out from the main land just to the southward of the Pictured Rocks. To avoid these dangers, two range-lights on the west side may be advantageously placed on Williams's island, where they will serve the double purpose of guarding the seamen on entering the bay, and afterwards in clearing the shoal ground above mentioned.

At the east entrance a light might be placed, either on the extremity of Sand Point shoal, (in which case it would be a screw pile,) or on a rocky point of the island opposite. In both of these situation it would not only afford sufficient direction for entering the bay and clearing Sand Point shoal, but it would also show at the lower part of the west entrance, and keep the seamen clear of the shoal ground south of Grand island.

The statement by which the committee expects to satisfy the board of the expediency of these lights is this: that there is no other harbor of refuge on this bare, rocky, and inhospitable coast from White Fish point to Copper harbor, a distance of about one hundred and fifty miles direct, and one hundred and eighty miles by the coast, with the exception of Marquette, which harbor enjoys a natural protection from northwest and north storms only, and is open to northeast storms. To this is to be added, that this reach of coast between White Fish point and Copper harbor is a lee shore to the worst storms of this tempestuous climate, throughout the greater part of its extent.

This statement contains the urgent reasons for making both the entrances to Grand Island bay safe and easy of access by range and other lights. It is, also, a reason for putting a fog whistle, bell, or trumpet on White Fish point, of which we may speak in another report.

It will be observed, by looking on the map, that the harbor at the bottom of Kencewaw bay is good for all winds, but it is out of the way. It is proper, however, to notice its connexion with the statement we have just made, and to say that if a small light were placed at the entrance of the harbor of l'Anse it would convert it into a safe harbor of refuge in all weathers, at night as well as by day. The light should be placed on the northwest point of the entrance; this is the turning point into the bay, and has, moreover, a sand spit running off from it.

Williams's island, on the west side of Grand Island bay, on which the range-lights are to stand, is, as the committee learned at the land office at Marquette, not sold; and the committee recommend that application be made for its reservation for light-house purposes.

The land on which the light is to stand, on the east side of the bay, would, according to the representation of Mr. Barney, of the lake survey, be readily given up by its owner.

IV. Range-lights for Copper harbor.

This is the finest harbor on this part of the coast. It possesses good water, affords a perfect protection, and has sufficient depth on the bar for all vessels navigating the lakes, fifteen feet.

The entrance, which is on one end near the light, is narrow and, though straight, very difficult, because bounded by dangerous reefs. In fact, it would be impossible to enter the harbor in the clearest night without range-lights, and, accordingly, they are maintained at private expense. There is a dry range also. At this point is Fort Wilkins, now entirely deserted. The property, which is of much value, is rapidly going to ruin.

The committee suggests the propriety of directing the attention of the War Department to this subject.

The accompanying sketch exhibits the several peculiarities of the harbor, and the position of the public buildings at Fort Wilkins.

The importance of improving this and other harbors is evinced by the fact that, just before the committee entered the lake, a vessel was compelled to run, during a storm, one hundred and sixty miles before she could find protection.

The range-lights proposed by the committee, which will take the place of the private lights, will stand on the reservation which embraces Fort Wilkins and its grounds and buildings.

The value of Copper harbor cannot possibly be over-estimated. It is not only the finest in this part of the lake, but it is in itself a grand basin, destined to become the seat of a rich trade.

The valuable mines in its vicinity have already attracted a considerable population, and built up a town which is respectable in size and appearance, and its future increase is as certain as the natural growth from infancy to maturity. Indeed, it was one of the general views, repeatedly forced upon the attention of your committee, that it was necessary to make an effort of the mind to comprehend the remarkable progress of this region up to this time, and its certain rate of growth hereafter.

Out of this view arose the conviction that the best service which the committee could render the board would be to show the necessity for a great exertion to keep pace with the wants of this new community.

(V. Round Island light, river Ste. Marie, above the Sault.)

One of the inquiries confided to the committee related to the renewal of this light. Your committee does not know what reason was assigned for the discontinuance of this light, and finds it difficult to believe that this recommendation could have proceeded from any one acquainted with the ground and versed in the art of piloting.

The direct channel running north, from Round island to Point Iroquois, lies between a long and broad sand spit to the eastward, and shoals and rocks to the westward; it is, moreover, very narrow.

This light, taken in combination with Point Iroquois light, insures the safe navigation of the channel. If this channel be not used, it is necessary to take a circuitous route around the bay.

It frequently happens, however, that for want of this light, vessels actually wait until daylight, when they can have the light-house building for a guide through this dangerous reach.

Such a detention, occurring in the track of a regular navigation, and falling upon vessels carrying rich freights of copper, and exposed to the long nights and inclemencies of a high latitude, is a serious distress; which, happily, the board has it in its power to remove by its own action. The committee recommends that Round Island light be relighted.

(VI. Port Clinton, Ohio.)

The removal of this light, which has also been discontinued, was one of the questions which the committee was requested to investigate. The committee requested Colonel Graham to send one of his assistants to examine into this question, and to report the result to the chairman. He has not yet been heard from.

Port Clinton is an obscure town, off from the fixed line of travel. To have gone to it would have occupied more of the committee's time than it was thought to be worth.

This is the last of the special cases consigned to the committee, but having pursued the usual route of navigation from Detroit to Ontonagon, in the extreme northwest county of Michigan, on Lake Superior, the committee became acquainted with its wants, and were enabled to make some observations which will be of interest to the board.

a. A fog-bell, or trumpet, on White Fish Point has already been mentioned. This is the turning point on entering the river Ste. Marie, and it affords a snug anchorage in bad weather.

b. A light of the lowest order on Granite island, a large rock, or small island with trees on it, off Marquette, would be acceptable. This rock is not easily seen in bad weather, and it is right in the way.

c. A light of good size on one of the Huron islands would render valuable service as a coast light.

There is no light visible after losing Marquette until Portage river light heaves in sight. This light, however, is shut off by Huron islands, and the trend of the coast to one approaching it in this direction. The light is required as a general guide in both directions; for it is near this spot that the course changes, whether going west to Portage lake, or east to Marquette.

d. A small light is wanted at the entrance to Portage river, on the end of the pier.

The channel is not much wider than the largest steamers, and in order to enter it in the night time it is necessary to lower a boat and send out a lantern to mark the entrance—a very inconvenient detention in bad weather.

This small light can be tended by the keeper of the main light, the distance between the two being a walk of fifteen minutes. It is only needed from the opening of navigation to the first of December, at the furthest. An increase of salary of two hundred dollars would sufficiently compensate the present keeper for this additional duty.

e. There exists a similar necessity for range-lights in Eagle harbor as in Copper harbor, similar in kind, but not in degree.

There is less water over the bar at Eagle harbor, where the depth is below ten feet, and the bottom is rocky. But here, as at Copper harbor, a day range was necessarily established by private individuals, and if two very small lights were put up, of the character of bug lights, small vessels would profit by them. The land belongs to the Eagle Harbor Company, which will gladly transfer the small quantity necessary for this purpose, on account of the advantage which the company would expect to derive from its use in this way.

f. Manitou light is admirably situated for the general navigation of the lake. But the commerce and navigation of Lake Superior are very much influenced by the configuration and contents of the southern coast. From this there extends into the lake a remarkable projection, called Keweenaw Point, which immediately attracts the attention on a glance at the map. It is in the form of an immense horn, slightly curving to the east, about eighty miles long, and about forty-five miles wide where it joins the main land. Along the whole length of this projection there extends a belt of trap rock, in which is found the peculiar riches of this district. This is in the masses of pure copper, of such magnitude that their bulk becomes the principal obstacle to their easy mining.

The points of entrance to the copper mines on the projection, which is the location in which the metal is known to occur, are on the east and west sides, and consequently there is a much greater amount of commerce from point to point along the shore of the lake than formerly, and this change requires additional lights, while those which now exist still retain their original importance. The light which was intended to direct the mariner in his course from the head of the lake, in rounding this great projection, is placed on the outer side of a large island lying beyond the extremity of the point; and although this is still of the same importance to the object for which it was originally thus placed, it is of no value to the vessels which pass from points of interest on the west side of the projection to those on the east, since the course of these vessels is between the island mentioned and the extreme point of the projection. An additional light is therefore called for on Keweenaw Point.

This report has reached so great a length that it will be better, perhaps, to

stop here, though there remain a great many more lights to be spoken of, mentioned in our own notes, or those of Colonel Graham.

The new lights which we have here recommended are in Lake Superior, and a few remarks upon the business of this lake will be appropriate.

This business consists of copper and iron mining, of trade in furs, fish and lumber, the transportation of passengers in steam packets, and the trafficking with a population which depends exclusively upon foreign supplies for everything which it consumes or uses, except wood, water and fish.

We have already spoken of the rich copper mines of the Keweenaw region.

At the opening of navigation in the spring of this year the value of the copper which had accumulated during the winter at Portage lake amounted to seven hundred thousand dollars.

The whole yield of all the American copper mines in the region bordering on Lake Superior, during the preceding year, was estimated at ten thousand tons, which, at five hundred dollars per ton, would be equal to five millions of dollars.

The committee were informed that the yield this year would amount to seven millions of dollars in value.

The exportation of iron will amount to two hundred and fifty thousand tons, which, at four dollars a ton, would be equal in value to one million of dollars.

Some of this iron is smelted on the spot, but a great deal of it is carried in the ore to Detroit, and to all the cities along the southern shores of Lake Erie, and even penetrates as far as Pittsburg, where it is mixed in the furnace with the native ores.

The value of the fur trade of Lake Superior, for the present year, is believed to be fifty thousand dollars; that of the trade in fish, ten thousand dollars; that of the lumber trade, one hundred thousand dollars.

The packet steamers, running from the other lakes to Lake Superior, are eleven in number; they carry, on an average, one hundred and twenty-five passengers on a trip, and make fifteen trips a year, thus numbering about twenty thousand passengers during the year. In addition to this, they always carry valuable freights, particularly of provisions, furniture, and such articles as come under the head of family supplies.

The whole number of vessels of all descriptions trading on Lake Superior, and engaged in the transportation of copper and iron as well as ordinary traffic, amounts to sixty.

The precise significance of these figures will not, however, be perfectly understood, unless a single glance is taken at the population of these mineral regions. The most populous portion is that bordering on Portage lake and river, where stand the two towns of Houghton and Hancock; the former of which is a handsome as well as a flourishing village, and has a hotel that would do no discredit to any country town in the Atlantic States.

There is now in the two towns and in the adjacent mines a population of seven thousand people, and yet the first tree was cut in Houghton five, and in Hancock three years ago.

The whole population of the country which the committee visited is about thirty thousand; and yet the canal around the Sault was opened, and the first vessel from below passed into the lakes but eight years ago. But it must be remembered that this is the part of the shore of the lake which has been first settled, and these are the mines which have been first worked.

The mines of Minnesota and the resources of Wisconsin are still undeveloped.

And, finally, no railroads have connected the northern and southern shores of the great peninsula of Michigan, or united the borders of Lake Superior with the valley of the Mississippi.

What your committee has here said upon the present condition and future prosperity of Lake Superior must be regarded as the merest sketch.

It intends to submit a second report, in which will be found valuable information obtained from Colonel Graham, showing the immediate want of twelve or more additional light-houses in the northern lakes, and also the remainder of its own notes, which relate chiefly to additional facilities for navigation in the river Ste. Marie, and Lakes George and St. Clair.

This second report will also contain some general views with regard to the commerce of the lakes taken together.

In conclusion, the committee moves—

1. That measures be taken, in compliance with the rules of the board, to construct and fit up those light-houses mentioned in this report, for which appropriations already exist; and,

2. That appropriations be asked for those light-houses not already provided for by law.

All of which is respectfully submitted.

C. H. DAVIS,

Rear-Admiral U. S. N.

JOSEPH HENRY,

Secretary Smithsonian Institute.

UNITED STATES COAST SURVEY STATION,

Near Bridgeport, Connecticut, October 31, 1863.

SIR: In accordance with the law and regulations for the Coast Survey, I have the honor to submit my estimates for the fiscal year 1864-'65, and to request that, if approved, they may be inserted in your estimates of appropriations. The estimates are accompanied by a brief statement of progress during the year, and are adapted, as those of last year, to the plan of working approved by you, by which all the aid possible is rendered by our organization to the operations of the army and navy; the regular surveying work being also carried forward wherever protection can be had for it, or where no such protection is needed.

The estimates for the present fiscal year, to which the appropriations corresponded, were much diminished from those of 1860-'61 and 1861-'62, being \$306,000 for all the branches of the service on the Atlantic, Gulf, and Pacific coasts. The estimates now submitted agree with the sums appropriated last year, and will enable us to continue the field and office work on the same reduced scale; to keep up the organization of our trained officers in field and office operations; to put into practical form, for the use of the departments and officers of the government, the information already collected; to continue the office compilations for use by the fleets, armies, and expeditions, and the publication of such maps as general public interests may render desirable or expedient. The opinions of distinguished officers, as to the direct bearing and usefulness of the work in the public service, will be given in full in my report for this year. The services at Port Royal and at the mouths of the Mississippi, referred to in my last report, have been followed up this year in the military department of North Carolina; on the coast of South Carolina and Georgia, particularly near Charleston, and at Tybee and Wassaw; in Louisiana, west of the Mississippi; and in the Mississippi and Yazoo rivers, during the sieges of Vicksburg and Port Hudson. In the first-named department, besides the triangulation of the Neuse river by Assistant Fairfield, reconnaissance maps were made by Assistant West and Sub-Assistant Rockwell, while the enemy threatened Newbern and Little Washington. Charleston bar was surveyed by night and lighted and buoyed by Assistant Boutelle with the steamer Bibb, just previous to the naval attack of April last. Port Royal bar was resurveyed by his party, and the

TREASURY DEPARTMENT,

Office Light-house Board, Washington City, Oct. 5, 1864.

SIR: I have the honor respectfully to submit a report of the operations and condition of the light-house establishment for the fiscal year ending 30th June, 1864.

In the first light-house district, embracing the coasts from the northeastern boundary of Maine to Hampton harbor, New Hampshire, (44 lights,) the various light-house structures have received careful and intelligent supervision, and their condition gives assurance of faithful discharge of duty on the part of the employés.

The stations have been renovated, and such repairs made as opportunity and the exigencies of the service would allow. Repairs more or less extensive have been made at the following stations, viz: Manheigin, Whitehead, Boon island, Martinicus, Saddleback, Owl Head, Deer Island Thoroughfare, Hendrick's Head, Negro island, Libby island, Eagle island Point, West Quoddy Head, Moose Peak, Nash's island, Narraguagus, Petit Menan, Mount Desert Rock, Bear island, Edgemoggin, Pumpkin island, Tenant's harbor, Seguin, Fort Point, Cape Elizabeth, Isle of Shoals, Portsmouth, and Whale's Back.

Every station in the district has been visited by officers or agents of the board within the year, and all indispensable requisites supplied. Under a system of constant supervision, all defects, needs, &c., are at once discovered and remedied.

The following stations yet require attention to bring them to a condition of the highest efficiency: Portland Head, Cape Elizabeth, Wood island, Goat island, Boon island, Little River, Libby island, Mount Desert Rock, and Moose Peak.

The light-keepers have been generally faithful to their trust, and in all cases the lights, so far as this board is advised, have given satisfactory aid to navigation.

An appropriation of \$20,000 was made at the last session of Congress "for additional aids to navigation to facilitate the entrance to Portland, Maine, by suitably marking Alden's Rock and Bulwark Shoal, or otherwise." After a careful investigation of the case, it is the opinion of the board that the proposed end will be best subserved by increasing the height of the tower at Portland Head and placing therein a light of the second order, which will have a range of visibility beyond Bulwark Shoal, and, in conjunction with the present lights at Cape Elizabeth, by giving to an entering vessel her exact position enable the master to avoid Alden's Rock. This plan has been adopted and the necessary instructions given for its immediate execution.

The buoyage of the district (comprising 290 buoys) has been maintained in an efficient condition, and the tenders have been usefully employed during the year. The severity and continuance of storms during the last spring carried from their stations many of the buoys, but they have been promptly replaced.

The Coast Survey has, at the request of this office, made examinations of several localities in this district for which buoys had been required, and it is expected that the necessary buoys will be placed upon the opening of the next working season.

The second light-house district embraces the coasts from Hampton harbor, New Hampshire, to Gooseberry inlet, Massachusetts, (53 lights.)

Important and needful repairs have been in progress at Cuttyhunk, Cape Ann, Marblehead and Point Gammon light-houses; and at the following stations renovations, reported as in progress at the date of the last annual report, have been completed: Wing's Neck, Edgartown, Narrows, Eastern Point, Long Island Head, Ipswich, Great Point, Boston, Monomoy, Long Point, Cape Poge, Chatham, Sandy Neck, Bishop and Clerks, Plymouth, Palmer's island, and Brant Point.

At Newburyport, in addition to repairing the works constructed for the pro-

tection of the site, it was found necessary, in order to conform to a change of channel over the bar, to remove the Bug Light to a new position. The buoys have been shifted so as to conform to the change.

The general state of the various aids to navigation in the district furnishes substantial evidence of the zeal and fidelity of the officers charged with the service.

The duties of repairing and of supplying deficiencies of illuminating apparatus and appliances have been performed with commendable assiduity and intelligence.

The iron beacon on Black Rock (Gloucester harbor) was run into by a vessel and seriously damaged. It was promptly repaired and re-established.

The wooden spar-beacon on Hardy's Rock was carried away and destroyed by the sea. A new beacon of a similar character has been provided, and will be placed in position at the first suitable opportunity.

The stone beacon at Great Fawn bar having become injured by exposure to heavy storms, instructions for its complete repair have been given.

Needful repairs to the fog-signals (bells) at Eastern Point, Cape Ann, and Race Point have been made. The signal at Cape Ann (whistle sounded by calorific engine) has been reported as being inefficient from want of power.

Minor repairs are yet required at a few stations; which, completed, will leave the district in a state of high efficiency.

The engineer reports that not a single case of neglect of the illuminating apparatus has yet reached his knowledge—a fact attesting the thorough instruction of the keepers.

The several light-vessels of the district (except Cross Rip) have remained almost continuously at their stations, the removals by stress of weather having been but of a very temporary character. The Cross Rip vessel was driven ashore at Cape Poge and lost. Her station has been occupied by the relief vessel of the district until within the past few weeks, when a new vessel becoming available, was sent to permanently occupy the station.

The buoyage and beaconage (\$18 buoys) have been well attended to, and seem to have given general satisfaction.

The duty of inspecting and testing oil and other supplies—the greater portions of which, for the whole establishment, are procured and distributed from this district—has been faithfully and satisfactorily performed.

The third light-house district embraces the coasts from Gooseberry Point, Massachusetts, to Squam inlet, New Jersey, including Lake Champlain and Hudson river, (92 lights.)

The various aids to navigation in this district have been zealously cared for, and a rigid and constant supervision has shown them to be in a state of great usefulness.

Upon securing the site at Staten Island as a depot for light-house purposes, measures were immediately taken to push forward to completion the buildings necessary for the reception of stores, supplies, &c. The storehouse is now well advanced in construction, and it is proposed to remove thither a large portion of the costly illuminating apparatus now stored at New York, thus saving high rent, and avoiding much risk of damage from fire, &c.

The embarrassments that have arisen in the prosecution of the work necessary to complete the arrangements for the transfer of this property from the revenue marine bureau to the Light-house Board have been submitted to the honorable Secretary, and it is hoped may receive his early attention.

The work of repairs at Princess Bay light-house, in progress at the date of the last annual report, has been completed in a satisfactory manner. The keeper's dwelling is very old, and its replacement at a suitable moment by a new structure is proposed.

The lantern glass at Sandy Hook east beacon having been frequently shattered by the firing of the guns at the neighboring fort, it is proposed to remove,

at some future time, the beacon to a position nearer to the point of the Hook, which it is intended to mark, and which is steadily making to the northward.

Repairs and renovations, more or less extensive, have been made at the following light stations: New London, Robbin's Reef, Sand's Point, Brockway, Black Rock, Great Captain's island, Norwalk island, Old Field Point, Faulkner's island, North Dumpling, Morgan's Point, Gull island, Plum island, Horton's Point, Saybrook, Watch Hill, Point Judith, Prudence island, Bristol ferry, Nayat Point, Dutch island, Gardiner's island, and Eaton's Neck. Other repairs, &c., will be made as time and opportunity offer, and will be duly reported.

Extensive renovations at Warwick, Sand's Point, and Nayat Point light-stations are indispensably necessary, and special appropriations to meet the expense are asked of Congress.

The special appropriation for beacons at Connimicut Point and Bullock's Point, in Providence river, having been found insufficient for the erection of suitable structures, an estimate is submitted of additional funds required.

Extensive renovations are found to be required at Split Rock light-house, in Lake Champlain, and a special estimate of funds necessary to meet the expense of putting it in good condition is submitted.

The light-vessels have proved of great service, and have been maintained constantly at their stations during the year, none having gone adrift, and no accident or damage having occurred to any.

The Stratford Point light-vessel, for the rebuilding of which a special appropriation was, at the last session of Congress, asked but not granted, has undergone extensive and costly repairs from the general appropriation fund, and was, in May last, replaced upon her station. She is now in an efficient condition.

The Succunnet Shoal light-vessel having been judged to be in need of repairs, was taken into New London, and an examination showed that immediate and extensive overhauling was required. This was authorized and is now under way.

A fog-bell at Stratford Point, for which a special appropriation was made by Congress, has been erected, and is now in useful operation. The signal consists of a bell, worked by clock-work machinery.

The buoyage of the district (396 buoys) has been creditably performed. It is scattered over a considerable area, and requires unremitting vigilance; yet every requirement of navigation in this respect has been fully met, so far as this board is advised.

The bell-boat which had been repaired with the intention of replacing it at Shagwong reef has not been so placed, the experience of this board tending to discourage any attempt at using such vessels, especially in high latitudes, where the driving spray in winter soon aggregates into such a mass of ice as to insure the foundering of the boat.

The day-beacons in Bridgeport harbor need some repairs, which have been authorized and are now in progress. Saybrook beacon is also in need of some minor repairs, which will be attended to next summer.

The other beacons and spindles are in good order.

The two tenders of the district have been constantly and usefully employed.

The fourth light-house district embraces the coasts from Squam inlet, New Jersey, to Metomkin inlet, Virginia, including Delaware bay and tributaries, (18 lights.)

The aids to navigation within its limits have been kept in an efficient condition, with but few casualties or unusual expenses.

Congress having at its last session appropriated \$17,500 for rebuilding the beacon-light at Cape Henlopen, the old site being unsuitable by reason of the beach at that place having made out some 400 yards since 1842, vigorous measures to complete the work at the earliest practicable day have been taken, and it is now making good progress.

Considerable apprehension was experienced in consequence of the reported encroachment of the sea at Absecum, which it was stated would, in a short time, imperil the existence of the light-house structure at that point. The alarm seemed to be well grounded, but it was, and is, the settled conviction of the board that the encroachment had, from natural causes, reached its extreme limit, and that henceforth the water would recede. To determine this point a series of tests was inaugurated, surveys and measurements being made every two weeks, and thus far they have confirmed the previous conviction of the board as to the cessation of encroachment.

The necessity of works of protection to the light-house site at Cohansey, which is in danger from the steady encroachment of the water, and for which a special estimate was submitted at the last session of Congress, still continues, and an item to cover the expense is again submitted.

The Five Fathom Bank light-vessel, which occupies a position of great exposure off Cape May, was by stress of weather, in April last, driven from her moorings. She was taken to Wilmington, and after having new chain and anchor provided, was returned to her post.

The buoyage of the district (91 buoys) has received careful attention, and has given general satisfaction.

The fifth light-house district embraces the coasts from Metomkin inlet, Virginia, to New River inlet, North Carolina, including Chesapeake bay and tributaries, Albemarle and Pamlico sounds, (65 lights.)

In those portions of the district which have been brought permanently within the control of the government, the lights and other aids to navigation have been maintained in an efficient condition.

The remainder of the district is at present not in a condition to receive the attention of the board.

The fine first-order light-house at Cape Charles, which had progressed at the breaking out of the rebellion to a height of 80 feet, has been completed in a substantial manner, fitted with a first-order lens apparatus of the most approved pattern, and a light exhibited therefrom on the evening of the 7th ultimo. Owing to the liability of this important light to an attack from the enemy, a competent military guard for its protection has been asked for. Congress at its late session made an appropriation of \$20,000 for completing the work, but in consequence of the unprecedented rise in the price of labor and materials of all kinds, it was found that the expense overran the amount. An appropriation to cover the deficiency is submitted.

Repairs and renovations more or less extensive have been made at the following stations: Hog island, Blakiston's island, Piney Point, Pool's island, and North Point. Upon the last four, new lanterns have been placed.

The light-house at Sharp's island, in Chesapeake bay, is in imminent danger of being destroyed by the washing away of the bank on which it stands. The district engineer is of opinion that it cannot possibly remain during the coming winter. He has therefore made arrangements to have a temporary light shown, on the destruction of the light-house. An estimate of the amount necessary to meet the expense of erecting a new structure, in a secure position, is submitted.

The light-houses at Clay island, Fog Point, Watt's island, Tuckey Point, Fishing Battery, and Havre-de-Grace, being at present fitted with lanterns of an old and exceedingly defective character, the interests of commerce demand that steps be taken to remedy the evil. An estimate to cover the cost of furnishing new lanterns of proper plan is submitted.

The fine cut-stone tower at Cape Henry (built in 1791, and yet in excellent order) is liable to injury from fire, in consequence of having an old-fashioned wooden stairway, greatly decayed and insecure. It is deemed advisable to provide a cast-iron spiral stairway for this tower, and an estimate to cover the cost is submitted.

The light-house at Wade's Point, whose destruction for the second time was alluded to in the last annual report, has not been re-established, the danger of a recurrence of injury from the rebels not yet having been entirely removed. The interests of commerce at this time will not materially suffer from its not being lighted.

At the date of the last annual report, a temporary light-vessel marked Brant Island shoal. Since then a screw-pile light-house has been erected on the point of the shoal, and lighted, and the vessel removed to Newbern, where in March last she was sunk by order of the military authorities, as an obstruction to rebel naval movements in Neuse or Trent river.

The light-stations at Cape Hatteras and Cape Lookout being fitted with wooden steps, and liable from that cause to accidents from fire, estimates for proper stairways of cast iron are submitted.

The absence of any special pressing necessity for re-establishing at this time the lights at Body's island, Pamlico Point, and Bogue Banks has induced the board to abstain from any action in the premises.

The light-vessel service of the district has been carefully attended to.

Two of the light-vessels which were mentioned in the last annual report as being detained in New Bedford, under the lien law of the State, for debts due by the contractor, have been placed upon the stations on Upper and Lower Cedar Points in the Potomac river, for which they were originally designed. A competent guard for their protection has been detailed from the army.

Extensive repairs have been made to the Willoughby spit light-vessel.

The light-vessel which formerly marked the Tail of the Horse Shoe being, by the re-exhibition of Cape Henry light-house, rendered unnecessary, was placed to mark an obstruction in Elizabeth river, upon the recommendation of the military authorities.

Upon application of the War Department, in May last, a light-vessel was placed to mark a spit off the entrance to York river, Virginia, where she remained until August 2, at which time, her services being no longer desired as a means of facilitating the movements of army transports, she was removed. She has since been placed on Wolf Trap shoal.

The light-vessel formerly marking Royal shoals, North Carolina, was removed by the rebels in 1861, and sunk as part of the barricade in Neuse river; but after the capture of Newbern by the United States forces, she (with two others) was raised. She was subsequently brought to Baltimore, thoroughly repaired, and is now employed as a relief vessel for the district.

The light-vessel on Frying-Pan shoals, North Carolina, was driven from her station during a severe storm and put into Port Royal, South Carolina. Her services being indispensable elsewhere, she has not been returned to her station, but the board hopes soon to be able to replace on the Frying-Pan shoals a new vessel now building under contract.

In May, 1864, a raiding party of the enemy crossed the Potomac and effectually destroyed the lantern at Blakiston's Island light-house, besides committing other depredations at the station. The necessary repairs, including the furnishing of a new lantern, are in progress.

Upon the movement of the army of the Potomac to the south side of James river, necessitating the use of that highway as a medium for transporting stores and supplies, the lights at Point of Shoals, White shoals, and Deep Water shoals, were re-established, and have been, up to this time, continued in operation. Their permanency will depend upon their protection from the enemy.

The excavation of iron ore at Lazaretto Point, near Baltimore, has been continued during the year, as weather and other circumstances would permit, and about 700 tons have been obtained and sold, the net amount accruing therefrom, \$1,042, having been paid into the treasury of the United States. The

general appearance of the place of excavation gives assurance of a much larger yield as the work progresses.

The advantages expected to arise from the storehouse and wharf belonging to the light-house establishment at that place have not been enjoyed to the full extent anticipated, for the reason that the greater part of the storehouse has been appropriated by the military authorities for storing ordnance materials.

The buoy service of the district (548 buoys) has been satisfactorily performed, though under great embarrassment from scarcity and high prices of labor and materials.

The rebels having, in July, destroyed a part of the railroad bridges over Bush and Gunpowder rivers, gunboats have been stationed as a guard against a recurrence of the damage. To facilitate the movements of these vessels, the channels have been suitably marked by buoys.

In the sixth light-house district, embracing the coasts from New River inlet, North Carolina, to Cape Canaveral light-house, Florida, inclusive, (36 lights,) the limited amount of territory recovered to the authority of the United States has, as reported last year, resulted in but few measures for restoring lights and other aids to navigation.

The new lights established to facilitate entrance into Port Royal harbor have proved of immense benefit to the large commerce seeking that port. The vessel at Fishing Rip, a part of the system of ranges for this entrance, was furnished the board by the Navy Department, but was found to be too old and unseaworthy to contribute as effective service as was desired. She was accordingly removed and converted into a hulk for storing light-house materials and supplies, and the light-vessel formerly marking Frying-Pan shoals, North Carolina, which had been driven into Port Royal by stress of weather, was stationed at Martin's Industry, in place of the vessel formerly there, and which was deemed to be too small for so exposed a position, while the latter vessel (Martin's Industry) has been placed on Fishing Rip. This exchange has been found to be of great benefit to the service.

The Rattlesnake Shoal light-vessel, off Charleston, was, during a severe storm, driven from her station, with loss of moorings. She was supplied with new chains and anchors, and replaced at her post.

On the inauguration of the military movement into Florida, by way of St. John's river, in February last, the general commanding represented to the board the absolute necessity of suitably marking the changeable and narrow channel of that river. Prompt measures were taken to comply with the request of the military authorities, and as soon as possible the necessary buoys were placed in position, and the lights exhibited from the old tower at the mouth of the St. John's.

Steps have been taken, also, upon the recommendation of the military authorities, to re-establish the light formerly in operation at Amelia island; the necessary repairs and renovations were made, and its re-exhibition at an early day is confidently looked for.

The buoyage of the district, (272 buoys,) so far as practicable, has received careful attention, the following localities having been properly marked: Charleston bar, St. Helena sound, Port Royal, Tybee bar, Calibogue sound, and Nassau sound.

The seventh light-house district embraces the coast of Florida, from St. Augustine to Egmont key, (12 lights and 79 buoys.)

The lights and other aids to navigation, so far as they are under the control of the board, have been kept in useful operation, and it is hoped that the recent successes of the United States forces in the Gulf will have the effect to bring within the range of restoration other lights and buoys.

When it becomes advisable to do so, the board will re-establish these aids as rapidly as safety, time, and other circumstances will permit.

In the eighth and ninth light-house districts, embracing the coasts from Egmont key to Rio Grande, Texas, (50 light-stations,) the various aids to navigation, so far as they have been recovered to the custody of the United States, have been carefully attended, and their condition, under the peculiar circumstances of the case, is highly satisfactory.

Upon the occupation of the southern portion of Texas by the United States forces, application was made by the military authorities for the re-establishment of the lights at Point Isabel, Ship shoal, Point de Fer, Timballier, Aransas Pass, and Padre island. Measures were promptly inaugurated to ascertain the condition and necessities of these stations, and suitable illuminating apparatus has been sent out to be put in position when the requisite repairs shall have been completed.

The investigation on this occasion developed the following state of facts :

The light-house on Southwest reef was found to have sustained much damage from the rebels.

At Matagorda the foundation has been in a great measure blown out and the tower partially thrown down. The keeper's dwelling is gone.

Matagorda Swash light-house has been entirely destroyed.

Padre Island light-house has been entirely destroyed.

Saluria light-house has been partly destroyed.

The re-establishment of the light at Barrataria (discontinued in 1859) having become a measure of considerable importance to the army and navy, by reason of the occupation of Fort Livingstone, and the consequent frequent intercourse between that point and other stations on the coast, was authorized. This light is, moreover, a convenient point of departure for the numerous transports, &c., going westward by the inside passage at Ship shoal.

Upon the capture by the United States forces of the approaches to Mobile bay, immediate steps were taken to re-establish such lights in that vicinity as might be assured of permanent security. The necessary examinations have been made with a view to determine the extent of repairs required, and the lights will be re-exhibited whenever it is deemed advisable.

The tower at Mobile Point, standing in close proximity to Fort Morgan, was completely riddled by heavy shot during the bombardment of that work. It will eventually have to be entirely rebuilt. A temporary light of a small class has been established upon the highest point of the southwest bastion.

The magnificent tower at Sand island was blown up by the enemy early in the commencement of the rebellion. It will have to be entirely rebuilt. Meanwhile steps have been taken to establish temporarily a fourth-order light at this point.

The bell-boat formerly stationed to mark the entrance to Pass à l'Outre, and which had been removed from its station, has been recovered and taken to New Orleans.

The bell-boat which marked Mobile bay entrance was found partially buried in the sand on Dauphin island. Instructions for its recovery have been given.

The day-beacons at Pass à l'Outre were, during a very severe storm, destroyed, but measures were adopted to replace them by approved wooden structures.

The two tenders of the district have been constantly and usefully employed in attending buoys and in transporting workmen and materials for the repair and re-establishment of lights, &c. They have received considerable renovation during the year.

On the 19th of July last the tender Martha, while engaged in the performance of her duties, was captured in Chandeleur sound by a party of rebels. After stripping the vessel of fixtures, rigging, furniture, and cargo, she was burnt, and her master and crew taken prisoners. The master subsequently escaped and returned to New Orleans.

The buoyage of the district (124 buoys, &c.) has received as much attention as the difficulties of the case would permit.

The tenth light-house district embraces all lights, &c., on Lakes Erie and Ontario, and St. Lawrence and Niagara rivers, (33 light-stations.)

The several aids to navigation are generally in good order, but few extensive repairs having been found necessary. The inspector states that no reports unfavorable either to the lights or keepers have been brought to his notice, and that, so far as known, general satisfaction has been given to navigators and others interested in commerce.

On the night of the 1st of January last the light-house at Green island, Lake Erie, was destroyed by fire. Measures were taken to provide temporary expedients for the exhibition of the light during the season of navigation, and an estimate of funds required for the erection of a new structure is submitted.

Various and extensive repairs and renovations having been found to be necessary at Galloo Island and Turtle Island light-stations, special estimates of appropriations required to cover the expense of these works are submitted.

The light at Port Clinton, which was discontinued in 1859, having been represented to be necessary to the commerce of the lakes, the question was investigated, and the result was such as to warrant the board in recommending to the honorable Secretary of the Treasury the re-establishment of the light. The necessary authority having been given by the department, the light was re-exhibited August 1, 1864.

The buoyage of the district (72 buoys) has received careful attention, and these aids to navigation have been maintained in an efficient condition with less than the usual number of casualties.

Representations having been received to the effect that the channel formerly used in Sandusky bay had again become practicable, and that the old ranges which had been discontinued on account of uselessness should be re-established to facilitate the commerce of the locality, the necessary surveys to verify the report were ordered and made, and resulted in its confirmation. The work of re-establishing these ranges will be commenced as soon as practicable, plans and estimates for permanent works being now in course of preparation. Meanwhile a temporary range has been established.

The eleventh light-house district embraces Lakes St. Clair, Huron, Michigan, and Superior, and Green bay and tributaries, (48 lights.)

The aids to navigation within its limits have been carefully attended, and many important works of renovation have been completed during the year, or are now in progress.

Under authority of the department, the light at Round island, (river Ste. Marie, above the Sault,) discontinued in 1859, has been re-established, and the light will be re-exhibited in a few days.

In consequence of a reported difficulty in distinguishing the small light at St. Joseph's from other lights in the vicinity, the color of the light has been changed from white to red, which it is hoped will effectually remove the cause of complaint.

The light-house at La Pointe was found to be in danger in consequence of the loose sand on which it is built having been by the action of the wind removed from around the foundation timbers. Stone piers sunk in the sand, and supporting cast-iron columns, have been erected, and on these the building has been placed. Should experience prove that the movement of the sand is not arrested, the surface of the ground will be coated with gravel.

The work upon the structures at Kenosha, Racine, and Milwaukee, for which special appropriations were made, has not satisfactorily progressed during the year. Notwithstanding every effort on the part of this board, it has been found impossible to secure from the contractors the necessary deliveries of timber, as agreed upon; and after exhausting every means to induce a performance of their

obligations, the board has felt itself called upon to order its engineer to declare the contracts forfeited for non-fulfilment, and to procure the requisite materials in open market. A scarcity of lumber has prevented, up to this time, any large quantity of timber being obtained. The purchases will be continued, as opportunity offers, during the autumn and winter, and it is hoped that a sufficient amount will have been collected during that time to warrant the commencement of framing in the spring. A considerable portion of the stone and iron work has been procured, and is now ready for use.

The fog-signal authorized by Congress for Port du Morts has been completed and put in operation. The signal consists of a trumpet blown by means of a caloric engine.

Renovations, more or less extensive, have been made at Fort Gratiot, Cheboygan, Tail Point, and Raspberry Island light-stations.

Much yet remains to be done to bring the various aids to navigation in this district up to a condition of the fullest efficiency, but no efforts will be omitted to push forward all works of indispensable necessity as time and means permit.

Extensive repairs are required at Copper Harbor, Eagle Harbor, Grand Island, Marquette, Ontonagon, and Windmill light-stations, for most of which works special appropriations are recommended.

The buoyage of the district (37 buoys) has been maintained in a satisfactory condition, but it has been found that many of the buoys have been dragged from their stations by passing tow-boats, an evil which seems to demand the interference of the law officers of the government.

The twelfth light-house district comprises the entire Pacific coast of the United States, (18 lights.)

The light-house structures in this district were mainly erected or largely rebuilt, under the direction of this board, and the benefits of original construction upon scientific principles are strongly manifested in the small amount of repairs they require annually.

The temporary light at Ediz Hook is yet continued. Difficulties have arisen to delay the construction of the permanent work authorized for this place. During the last spring a remarkable freshet destroyed the settlement of Port Angelos, and so complete was the destruction of the town that for a time it was believed that some other place would be selected as a port of entry, which would have lessened the necessity for the light. Owing to the advance in the price of labor and materials, the expense of the permanent work will overrun the appropriation, but the completion of the structure has been ordered, and the excess will be defrayed out of the general appropriation fund.

During a severe storm in October, 1863, the foundation of the light-house at Umpqua river was washed away to such an extent as to cause serious apprehension that the structure would be destroyed on the recurrence of a storm. The lens was accordingly taken down and removed. While the workmen were engaged in taking down the lantern, preparatory to removing it, the tower began to exhibit symptoms of tottering, and soon afterwards fell. The board is of opinion that the interests of commerce will be best subserved by establishing a new light upon Cape Arago, instead of re-erecting at Umpqua, and a special estimate to cover the cost is submitted.

The work of removing the light at Fort Point to a position over the stair-way of the fort, which was in progress at the date of the last annual report, has been satisfactorily completed and the new light exhibited.

A suitable building, to accommodate the buoys and appliances stored at Mare island has been erected, and great benefit is anticipated from the increased protection to this species of property.

New iron buoys having been found to be required for service on this coast, it was deemed advisable, in view of the enormous expense of freight from the

Atlantic seaboard, to have them constructed at San Francisco. A contract for their manufacture, on highly advantageous terms, has been concluded.

The general condition of the various aids to navigation is very satisfactory.

On application of this board, an appropriation was made at the last session of Congress for providing additional light-vessels for general service. Upon opening the bids obtained in response to the public advertisement, it was found that the prices were such as to admit of the construction and equipment of but three vessels, (two of 1st class and one of 2d class,) within the amount appropriated (\$150,000.) Contracts for such vessels were accordingly entered into, and the work is making good progress. It is proposed to place one of these vessels at Fryng-Pan shoals, in place of the boat transferred from that station to Martin's Industry.

Under the circumstances of unprecedented advance in prices of all materials and labor and the great scarcity of workmen, the board feels that it has reason to congratulate itself on having accomplished so much as has been done during the year. It avails itself of this occasion to acknowledge valuable assistance and facilities received from the War and Navy Departments and the Coast Survey.

The necessity for seeking for an economical and abundant illuminating material for the lights under its charge was pressed upon the attention of the board at its first establishment by the rapidly increasing price of sperm oil and the progressive increase of lights required to meet the demands of a constantly developing commerce. These lights now amount in the aggregate to about 500.

Accounts having been received of the introduction of colza or rape-seed oil into the light-houses of France with favorable results, measures were taken to import some of the oil for experiment and a quantity of the seed for distribution. Both the imported oil and that of home production have been used in some of our light-houses, and there is good reason to expect that, when circumstances shall admit of its more extensive cultivation, and experience shall perfect its purification, some reliance may be placed on this source of supply. One thousand gallons were purchased in May, 1864.

Careful experiments have been made and are still in course of prosecution with lard-oil. The results so far have been very favorable, both as to illuminating power and fluidity at low temperature, and the board has strong reason to expect that it may ere long look to this material for an economical and unfailing supply.

In the last annual report some statement was made of the relative cost of these illuminating materials which will apply substantially at this time.

Fifteen thousand gallons of lard-oil were purchased in April and distributed for use during the winter.

Since the last annual report the board has been called upon to lament the loss of one of its original and most useful members, in the death, on the 22d of April, of Major General Joseph G. Totten. A member of the special board to inquire into the condition of the light-house establishment, and then of the present board, he took an important part in all their duties, and the engineering operations of the establishment bear testimony to his professional industry, and especially to the splendid light-house on Minot's ledge a monument of his engineering skill.

I am, very respectfully,

W. B. SHUBRICK,

Rear-Admiral, Chairman Light-house Board.

HON. W. P. FESSENDEN,

Secretary of the Treasury.

WASHINGTON CITY, *October 22, 1864.*

GENTLEMEN: I have expended a considerable portion of my vacation in the further investigation of the subject of the materials used for light-house illumination, and in studying the phenomena of sound in their relation to fog-signals.

The previous investigations in regard to the properties of lard-oil clearly indicated that this material could be advantageously substituted for sperm oil in the Fresnel apparatus and in the Franklin lamps, in which the combustion is carried on at a high temperature, while, from its greater specific gravity, less fluidity and less ascensional power at lower temperatures, it would not be as applicable to smaller lamps, in which the oil is supplied at a lower temperature, and in a considerable degree by what is called capillarity.

These conclusions have been fully borne out by experiments on a larger scale during the past year. The lard-oil has been found to succeed in the coldest weather, and to be capable of yielding more light with the same lamp than sperm oil, and with not more than a corresponding amount of consumption.

It is true that a number of complaints have been made against lard-oil by light-house keepers, but these complaints have in every case been found similar to those which have been made from year to year by incompetent keepers against the sperm oil, with which they were previously furnished. The difficulties complained of have arisen from carelessness or ignorance in the management of the lamps.

This remark does not apply to the complaints of the keepers of light-vessels, since the lard-oil, as was shown by my experiments, is not well adapted to burning in lamps of the kind which are employed on board these vessels, and I regret that, contrary to my oral directions, this kind of oil should have been supplied for use in this branch of the light-house service.

My attention has, during the last month, been especially devoted to the lamps and the material for the use of light-vessels, and I think the results of the investigation thus far bid fair to introduce improvements of some importance.

Though petroleum oil cannot be used in the Fresnel or Franklin lamps, or any of the larger lamps, yet I think it may be employed with advantage in those of smaller size, and particularly in those on light-ships. I have obtained a fountain lamp with a circular wick, which burns petroleum in great perfection, and which, I think, can be adapted to the lamps used with the reflectors on board light-vessels.

I have also made some experiments on the different kinds of wick to be used with lard-oil, and in this case, as in others, have endeavored to introduce scientific methods in the improvement of the materials and operations of the light-house service, instead of the loose empirical modes which are frequently employed for arriving at practical results.

The experiments on sound, which have been commenced, are not in a condition to warrant an account of them at this time. I may mention that a committee of the British Association has been charged with the investigation of the subject of fog-signals, and that it might be well to confer with this committee on the subject. It is a question of some importance to ascertain whether the steam-whistle, actuated by atmospheric air, cannot advantageously be substituted for the trumpet, and whether there is a preference in the different notes of a sounding apparatus as to the penetration of the air when filled with fog.

I am sorry to learn that the small appropriation asked from Congress for defraying the expenses of experiments was not granted. The committee of Congress to which the subject was referred were probably unacquainted with the fact that the result of the experiments on oils have saved the government in the purchase of light-house materials at least forty thousand dollars, and that the continuance of investigations of this kind will always tend, not only to lessen the cost, but also to increase the efficiency of the light-house service.

Although the members of the light-house board are willing to give their services gratuitously, they cannot be expected to defray the cost of the investigations.

Respectfully submitted.

JOSEPH HENRY,

Chairman of Committee on Experiments.

The LIGHT-HOUSE BOARD.

UNITED STATES COAST SURVEY STATION,

Near Danbury, Connecticut, September 30, 1864.

SIR: In conformity with the regulations for the Coast Survey, I have the honor to submit my estimates for the fiscal year 1865-'66, and would respectfully request that, if approved, they may be included with your estimates for appropriations.

A brief statement of the progress made during the year will be appended, showing the adaptation of the survey in all parts of its organization to the present requirements of the government service in connexion with military and naval operations.

The estimates now presented agree in amount with the appropriations of last year, which, like that for the preceding year, was much less than the appropriation for 1861-'62.

They conform to the plan of working approved by the department, being designed to keep the survey in progress in its regular work, to render active aid in co-operating with the fleets and armies of the Union, and to continue the publication of maps and charts now rendered so important as adjuncts in prosecuting the war. The evidence as to the value of our field and office work in that connexion has been made conclusive by the uniform tenor of communications from officers of high position in the army and navy.

The war has not essentially changed the distribution of the working parties. About the same number as heretofore assigned to duty on the southern coast has been in surveying service with the national forces in the rebellious States. Four parties have acted under the orders of Admiral Lee, three with as many vessels under Admiral Dahlgren, and two under Admiral Porter. For the military service in Eastern Virginia and Maryland, six parties have been employed during parts of the season: in West Virginia, three parties; at Knoxville, two parties; at Nashville, two; at Chattanooga, five; previous to and during the movement on the rebel works at Missionary ridge two parties accompanied the army in Louisiana and Texas, and one was attached to the Florida tax commission.

From the several officers in whose commands the parties have been associated, warm acknowledgments have been reiterated as to the importance of the services rendered and their bearing on the success of military and naval operations.

My annual report will contain, as usual, notices of the work in detail. Very brief mention will here be made of the localities and nature of this class of operations, and after it, mention of the advance made in the regular progress of the survey of the coast.

The survey has been kept in full co-operation with the blockading squadrons and with the armies of the Union, as heretofore. In the vicinity of Baltimore the survey of ground connected with the defences has been continued by Sub-Assistant Iardella, and during part of the season by Assistant C. M. Bache.

The topography of the approaches to the capital has been further extended beyond the northeast boundary of the District of Columbia by Sub-Assistant Ferguson. A minute topographical survey has been made of Arlington Heights by Messrs. Hergesheimer and McMath for the War Department, and special determinations for the effective use of heavy artillery at Washington, New York,