

REPORT OF THE LIGHT-HOUSE BOARD.

TREASURY DEPARTMENT,

Office of Light-house Board, Washington City, Oct. 26, 1865.

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, 1865.

In the first light-house district, embracing all lights, &c., from the north-eastern boundary of Maine to Hampton harbor, New Hampshire, repairs more or less extensive have been made at the following named stations: Wood island, Goat island, Saddleback Ledge, Deer Island Thoroughfare, Edgemoggin, Mount Desert, Libby island, Little river; and works of needed renovation are in progress at Seguin, Hendrick's Head, Burnt island, Manheigin, Negro island, and Dice Head; and it is the opinion of the board that the present condition is such as to warrant the belief that but few large works of repair or renovation need be undertaken in this district during the coming year. There yet remains to be done much that is desirable, but little that is indispensable.

The measures for facilitating the entrance into Portland harbor, viz., increasing the height of the light at Portland Head and substituting a large second-order lens for the fourth-order there in use, thereby greatly augmenting the range of the light, have been completed during the year and have been found to accomplish the desired object. It is believed now that the entrance to this harbor is so completely lighted that navigation in and out is attended with little or no danger. The keeper's dwelling at this station has been thoroughly repaired. In order still further to identify the two lights at Cape Elizabeth as day marks, four broad horizontal red stripes have been painted on the easterly tower, and on the westerly tower one vertical stripe.

The buoyage of the district has been maintained in an efficient condition, a service requiring, in this region of rapid currents and high tides, constant vigilance. The attention of the board having been called to the necessity of additional buoys to mark the dangerous ledges, Grindstone, Sheep Island, and Inner Bay Ledges, in Penobscot bay, the required examinations were made, resulting in the determination of their usefulness, and suitable buoys have accordingly been placed.

The necessity of supplying some more efficient system of fog-signals than at present employed, to aid the navigation of this rock-bound coast, has been seriously impressed upon the board, and careful investigation of the subject has been made. The result has been deemed sufficient to warrant the board in estimating for a sum to cover the expense of substituting the apparatus which may prove to be most effective.

Beacons consisting of casks on masts have been placed on Fiddler's Ledge, Harbor Ledge, and Portersfield Ledge, and spar-beacons have been set at Winslow's Rocks and Ames's Ledge.

A steam buoy-tender has been provided for this district in place of the two sailing-vessels heretofore employed, and which were reported to require extensive and costly repairs.

The second light-house district embraces the coasts from Hampton harbor, New Hampshire, to Gooseberry inlet, Massachusetts. The light-house service in this district has received especial attention, and is now in a satisfactory condition. Repairs and renovations have been made at Cape Cod, (Highlands,) Long Point, Billingsgate island, Nansett, Mayo's beach, Monomoy Point, Bass river, Bishop and Clerks, Great Point, Brant Point, Nobsque, Dumpling Rock, Clark's Point, Hyannis, Sandy Neck, Chatham, Cape Ann, Marblehead, Ten Pound island, Bird island, and other stations.

The structures standing at the discontinued light-house station at Point Gam-

mon, being found to be in a rapid course of demolition from lawless persons, fishermen and others, it was deemed prudent to have them taken down and removed to a place of greater security. Some of the materials, lumber, &c., have been used in the erection of buildings needed at other light-stations.

Repairs are now in progress at Gay Head, Race Point, Sankaty Head, and other stations, which, when completed, will leave the district, in respect to the structures, in a condition requiring but little attention during the next year.

A new spar-beacon, forty-five feet long, bearing a conspicuous day-mark, has been erected at Hardy's Rock, in place of the former structure, carried away by storms.

Extensive repairs have been made to the stone beacon at Great Fawn bar, which the action of ice and storms had rendered insecure.

The various fog-signals in the district have received careful attention, and are now in as good condition as their character will permit.

The last remaining old-style lantern in the district, that at Clark's Point, has been removed and an efficient and modern structure put up, and new and improved lamps have been introduced throughout the district.

The buoyage of the district has been well attended to and kept at all times, so far as circumstances would permit, in an efficient condition.

An inspection has been made of the light-house in the exposed position of Minot's Ledge, and its condition found to be perfectly satisfactory.

A steam-tender has been provided for this district, which is expected to do the work heretofore performed by two sailing-vessels, better, more promptly, and at less expense.

The inspector reports that the light-vessel service of the district during the past year has not been attended with a single casualty requiring the removal of any one of them from its station.

In the third light-house district, embracing the coasts from Gooseberry Point, Massachusetts, to Squam inlet, New Jersey, and including Lake Champlain and Hudson river, much has been done during the past year in the way of repairs and rebuilding, but as many of the structures, which are old, have not been planned on correct principles, much remains still to be done. The extensive commerce, foreign and domestic, traversing this district, demands that the system of lighting and buoyage should be as nearly perfect as possible.

Repairs and renovations, more or less extensive, have been made at the following stations: Newport harbor, New London, New Haven, Esopus Meadows, Saugerties, Stuyvesant, New Baltimore, Schodack channel, Van Wies Point, Block island, Princess bay, Elm Tree, Sandy Hook, West beacon, Fire island, Stratford River beacon, Bridgeport beacon, and Black Rock beacon.

At Rondout and Coxsackie, the light-houses require repairs and the sea-walls to be rebuilt. Special estimates of the cost have therefore been submitted to Congress. Other and less expensive works are required at Beavertail, Four-mile Point, Bergen Point, Passaic river, Black Rock, and Sandy Hook; and it is expected that the current appropriation for repairs and incidental expenses will meet the cost.

Special estimates are submitted to meet the cost of rebuilding the beacons for Norwalk island, Southport and Elbow beacon, which have been destroyed by the action of ice.

The failure of Congress at its last session to act upon the estimates submitted for operations at Warwick, Sands Point, and Nayat Point, in common with all other estimates for the light-house establishment, rendered it necessary to suspend the proposed works, and the estimates are again commended to the attention of Congress.

The beaconage and buoyage of the district have received careful attention, and all damages and losses incurred during the year have been repaired as far and as promptly as practicable.

The fog-signals of the district have received due attention, and the board, aware of the importance of rendering them as distinctive as possible, have set on foot a series of experiments, in order that the most effective appliances for warning the navigator in thick weather may be adopted.

A steam vessel has been provided for the district to take the place of the two sailing light-house and buoy-tenders now employed, which it is expected will perform the service more effectively, with greater despatch, and at less cost.

The arrangement entered into by which a designated part of the lot of land on Staten island ceded to the United States by the State of New York was to be transferred to the Light-house Board, has not been yet completed. The acting engineer in the service of this board, in a recent report, says: "The grounds are still occupied by the cotton agent. * * * There is a prospect of the premises soon being in our hands again." There is much to be done to these premises to place them in the condition contemplated by the Secretary of the Treasury, and by this board, at the time the arrangement was made. The facilities which the use of this depot will afford the board in its operations, when it shall be placed in the condition contemplated, are much needed, and it is respectfully requested that directions to complete the work may not be delayed longer than is absolutely necessary. (See appendix.)

Congress having made an appropriation of \$1,000, approved June 30, 1860, for "a survey to determine the proper site of a light-house at or near the Sow and Pigs, Buzzard bay," the coast survey was requested to do the work. A survey had been made in 1853, and careful measurements show that no change has taken place since. The board has not yet decided that the light-house at Cuttyhunk does not, in conjunction with the system of buoys on the reef itself, subserve all the requirements of commerce.

The fourth light-house district embraces the coasts from Squam inlet, New Jersey, to Metomkin inlet, Virginia, including Delaware bay and tributaries. In this district every essential repair and renovation has been made that the funds at the disposal of the board would allow. The deficiencies and wants of the district have been brought to the attention of Congress, and special appropriations asked for to meet cases which cannot be put off without incurring greater ultimate expense. Among these cases, that of Cohansey light-house is especially urgent. The necessity for providing an effectual protection to the work against the steady encroachment of the water, which has been several times urged upon Congress, is now more pressing than ever. A special estimate is therefore submitted to cover the cost of suitably banking in the site.

The measurements of the beach at Absecum light-house to determine the reported encroachment of the sea at that place have been continued semi-monthly during the past year. The changes in the ordinary high-water line so far have been so slight as not to justify any apprehension of immediate danger to the light-house. The observations, however, will be continued, and all necessary measures which may be required for the protection of the structure will be promptly taken.

Small but essential repairs have been made at Barnegat, Absecum, Cape May, Brandywine, Ready Island, Bombay Hook, and Fenwick's Island light stations.

Under authority of act of Congress a new beacon-light required at Cape Henlopen, in place of the old structure, in consequence of change of shore-line, has been erected. The new beacon-light is a screw-pile structure, built near the point of the cape. The old beacon was taken down, and some of the materials have been used to protect the site of the new structure. The remainder has been sold at public auction.

The increasing dilapidation of the present tower of Assateague has obliged the board to take measures for building a new one, as authorized by act of Congress. The execution of this work has been postponed, however, on account of more pressing wants in other branches of the service. It is now believed that

there should be no further delay, and measures are in progress to build a new first class tower for this important sea-coast station. It is found, however, that the sum available for this purpose is insufficient, on account of the rise in the price of materials and labor, and an estimate to cover the additional cost is submitted.

The buoyage and beaconage of the district is in a satisfactory condition.

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

It was only late in the year that the greater portion of the southern part of this district was brought permanently under the control of the government.

In the northern part the service of the district has been well attended to, and the various aids to navigation maintained in an efficient condition.

In James river the screw-pile light-houses at White shoals, Point of Shoals, and Deep Water shoals, which had been but slightly injured by the enemy, were temporarily put in order, and provided with new fog-bells and illuminating apparatus. The light-house at Jordon's Point, near City Point, was thoroughly repaired and re-established, sundry requisites being provided.

The light has been restored at Stingray Point, after making certain needful repairs to the screw-pile structure, which, though plundered of all movable articles, was but slightly injured. At New Point Comfort light-station the required repairs were much more extensive, and involved much time and expense. A new lens has been provided, and the light re-established.

Owing to the failure of the appropriation for light-house purposes during the last session of Congress, it becomes necessary again to represent the urgent necessity of building a new light-house for Sharp's island, Chesapeake bay. The unusual absence of storm-tides and heavy northwest gales during the past year accounts for the unexpected preservation of the present structure. The sea, however, is gradually but surely undermining the bluff, and has already reached one corner of the building, leaving no doubt as to the result. The estimate of last year for this work is therefore repeated.

The tram-road used in the construction of the new light-house at Cape Charles, being of no further service at that place, has been taken up and the material shipped to Baltimore.

Such slight repairs and renovations as were required in the district have been made, and the disposition of beacons and buoys there met every requirement of commerce.

In the waters of North Carolina the various aids to navigation which, at the date of the last report of the board, were in condition to receive its attention have been put in effective operation.

Immediately upon the close of the rebellion an experienced engineer was sent to those waters to take charge of the work of re-establishing such lights, &c., as the interests of commerce might be found to demand. A large quantity of illuminating apparatus, and other light-house material, which had been abstracted by the enemy, was recovered, and such portions as could be at once made use of were so applied, and the rest sent north for repairs and refitment.

Temporary lights for the accommodation of army transports and navy vessels were, upon the fall of Fort Fisher, established at the entrance to Cape Fear river and at Beaufort, but when the necessity under which they were placed ceased to exist the lights were discontinued.

In view of the fact that commerce has not as yet been re-established as it existed in 1860, the channels in many parts of the coast having, since that time, undergone material changes, it is proposed only to restore such aids to navigation on the southern coast as shall be deemed essential to the trade developed to those ports. It is, moreover, not at all improbable that commerce

may seek new channels, involving the necessity of an entirely new arrangement and new kinds of aids.

The work of re-establishing lights of undoubted utility will be pressed forward as soon as the means are supplied, an estimate of which is submitted.

The excavation of iron ore at Lazaretto Point, near Baltimore, has progressed during the year, but not so rapidly as had been desired, the scarcity of labor having caused the delay. Up to this time some 1,291 tons have been excavated and sold, the net proceeds, \$2,013 96, having been deposited in the treasury of the United States. With the present abundance of labor, it is expected that much greater results will be attained during the next year.

An appropriation was made June 20, 1860, for a light-house at the mouth of North river, Albemarle sound, North Carolina, but because that region was open to raids by the enemy it was not deemed prudent to take any steps towards building the structure, and the appropriation was suffered to lapse into the treasury. The necessity for a light-house at that point having been again strongly urged upon the board, an estimate to cover the cost is submitted.

The sixth light-house district embraces the coasts from New River inlet, North Carolina, to Cape Canaveral light-house, Florida, and within its limits the few aids to navigation which had been left unharmed by the enemy have been maintained during the year in useful operation. Measures of renovation have been necessarily confined to such temporary works as would serve the requirements of a recently developed commerce.

The approaches to Charleston were thus lighted immediately after the occupation of that place by the United States forces, but it was found, upon examination, that an almost total change had taken place, leaving no channel in the harbor as it was in 1860, and opening new ones. Under this altered state of things it became necessary to establish lights temporarily at such places as would be useful guides through existing channels, and to omit all others.

The light-vessel formerly placed off Rattlesnake shoal has been moored at the entrance to Charleston bar, and it is recommended that this position be made permanent, as the vessel will thus answer the double purpose of warning vessels from Rattlesnake shoal, and at the same time form a channel range over Main Ship bar. She will also serve as a guide for vessels approaching from the southward to clear Stono breakers.

A light-vessel equipped from materials collected from Charleston and Port Royal has been placed at the wreck of the monitor Weehawken, which lies directly in the channel way, and a temporary beacon-light has been established on a house on Sullivan's island. These two lights now mark the entrance over the bar and the channel up to the Weehawken. It is recommended that this temporary beacon-light be made permanent, and a suitable structure erected for it.

Temporary structures with steamer lenses occupy the sites (nearly) of the former lights upon Fort Sumter and Castle Pinckney, and answer a good purpose.

The gas-light at White Point Garden (battery) was left by the rebels in tolerably good order, and has been re-established.

The range-lights for Port Royal entrance have been continued. The Bay Point beacon-light (part of this range) is built on a large barrack erected by the rebels in 1861, slightly built, and already beginning to show signs of decay. This important harbor requires a light of the second or third order, and a special appropriation to cover the expense of the establishment of such a light is submitted.

Tybee beacon has been relighted, and temporary beacon-lights established to aid the navigation of Savannah river. The re-establishment of lights at the important stations of Georgetown, Cape Romain, Tybee, St. Augustine and Cape Canaveral, has occupied the consideration of the board, and preliminary steps to this end have been taken. The construction of the iron tower for

Cape Canaveral was suspended at the breaking out of the war, in the contractor's hands, with the understanding that the work should be resumed on notice being given by the board. Notice has been given accordingly, and the contractor has signified his intention to finish the tower as soon as possible.

The entrances to the following places have been buoyed: Winyah bay and Georgetown, (Battle Channel,) Bull's bay, Charleston, Stono river, North and South Edisto, St. Helena sound, Port Royal, Tybee and Calibogue sound, Warsaw sound and Wilmington river, Ossibaw sound and Ogeechee river, Sapelo sound, Doboy sound, St. Simon's sound, Fernandina and St. Mary's, St. John's river, St. Augustine.

In the seventh light-house district, which embraces the coast of Florida, from St. Augustine to Egmont key, the service has been carefully attended, and the lights and other aids to navigation which had been undisturbed by the enemy have been maintained in an efficient condition. Those which had been injured will be re-established as soon as practicable, energetic efforts to this end being in progress.

The important light stations, Cape Florida and Jupiter inlet, have received the especial attention of the board, and an experienced agent has been sent to that district with instructions to use every exertion to re-light those points, and the board has reason to hope that by next spring both of these lights will be again in operation.

The buoyage of the district has been kept up to the standard of efficiency so far as the limited means at the disposal of the board would permit.

In the eighth and ninth districts, embracing the Gulf coast from Egmont to Rio Grande, Texas, the work of re-establishing lights and other aids to navigation discontinued by the enemy has been kept prominently in view, and no effort has been spared to accomplish, so far as the means at the disposal of the board would permit, this desirable result.

The lights, &c., reported last year as having been restored to operation, have been maintained in an efficient manner, but at great cost, in consequence of the peculiar state of the markets in that region, the scarcity of skilled labor and the high price of materials forcing upon the service in these districts an expense entirely disproportioned to that of other districts.

The following stations have been repaired and refitted during the year, and are now in operation: Ship shoal, Shell keys, Southwest reef, St. Joseph's, Round island, (Miss.) Sand island, Bolivar Point and Padre island; and others are in course of refitting, and it is expected that in a few months most of those unlighted will be in full course of useful operation.

The buoyage of the district has received careful attention, and the board has great reason to congratulate itself upon having under such difficulties accomplished so much towards a restoration of needed facilities to the commerce of the Gulf.

In the tenth and eleventh districts, which embrace all lights from Lakes Erie and Ontario, and rivers St. Lawrence and Niagara, the various aids to navigation have been kept generally in good order, and the disposition of buoys and beacons leaves but little to be desired. No complaints in this respect have been received. The inspector bears testimony to the general attention to duty displayed by the keepers and assistants.

The work of rebuilding the light-house at Green island (destroyed by fire 1st January, 1864) has been pressed forward, notwithstanding the failure of Congress to provide the funds specially requested for the work, and a light was exhibited from the new structure on the 1st July, 1865. In the erection of this light-house a new and more suitable site was adopted. The expenses of this construction were very heavy; yet, as the work was of imperative necessity, the general fund for repairs was drawn upon to meet the bills. A special estimate

of this work is submitted, out of which it is proposed to reimburse the general fund for the amounts drawn from it.

The erection of the range-lights authorized by act of Congress for Maumee bay has not advanced during the year to the extent hoped for by the board. The delay has been occasioned partly by the difficult and complicated questions involved, but mainly on account of the impossibility of procuring the necessary land at private sale at prices warranted by the circumstances of the case. Resort was necessarily had to a tedious suit at law, which has just resulted in securing the requisite land to the government at reasonable rates. The work will be pressed forward to completion.

Upon an examination of the light-house at Mamajuda, it was found necessary to rebuild it, the present structures not being thought worthy of the repairs required to make them habitable. Temporary measures of protection have been adopted, and a special estimate to cover the cost of rebuilding is submitted.

The dilapidated condition of the light-houses at Galloo island and Turtle island has been heretofore reported, and special estimates to cover the cost of necessary repairs are again submitted. These stations are very important, and it is desirable that the necessary funds should be provided as soon as possible.

The light-house tower at Presque Isle having been reported to require immediate attention to preserve it from falling, a special examination was made. It was found to have settled very considerably; the masonry, moreover, being cracked, with a tendency to further insecurity. It is recommended that this tower be taken down upon the close of navigation this season, and rebuilt upon a proper and more suitable site. A special estimate to cover the cost is submitted.

The temporary range-lights at Cedar Point, Sandusky bay, referred to in the last annual report as having been established, have been continued, and the importance of rendering these aids permanent is such as to warrant the board in submitting a special estimate designed to cover the cost of suitable structures.

Many other works of repair in this district of less extent than the foregoing require attention. It is proposed to complete them as time and opportunity permit.

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

The lights and other aids to navigation within its limits have been maintained in an efficient condition. Various extensive works of renovation have been in hand during the past year, some of which have been completed. Others are still in progress; while many, from the large expense involved, must necessarily await congressional action.

The buoys, likewise, have been well attended.

The works of repair at Windmill Point light station, in contemplation at the date of the last annual report, have been completed, and a new distinctive illuminating apparatus will be put in operation on the opening of the next season of navigation.

The necessary timber for rebuilding the beacon and pier at Kenosha, Wisconsin, has finally been procured after much delay, and the work will be prosecuted to insure, if possible, the completion of the structures during the present season of navigation.

The requisite materials, timber and ballast stone, for the authorized structures at Racine, have been delivered, and the work is being vigorously pushed in order to secure it before the fall gales set in.

The extensive works reported last year as being in progress at Milwaukee have well advanced during the year, and it is expected that the light-house will be nearly completed by the close of navigation.

The light-house at Point Peninsula, between Big and Little Bay de Noquet,

Michigan, for which an appropriation was made by Congress July 2, 1864, has been completed and lighted.

Efforts have been made to establish a light at Sand Point, as authorized by act of Congress of July 2, 1864. A suitable sight was selected, but up to this time the holders of the land have been unable to convey a valid title to the United States. This being, under the law, a pre-requisite, nothing could be done in the matter beyond the preparation of plans and estimates for the work.

A system of range-lights for entering Copper harbor, authorized by act of Congress of June 20, 1860, has been completed and the lights exhibited. The necessary land at Fort Wilkins for the purposes of these range-lights, together with the valuable buildings which occupy it, were, by the courtesy of the War Department, transferred to the Light-house Board.

In the last report reference was made to works then in progress for securing the foundation of the light-house at La Pointe, Michigan. It has been found that the movement of the sand was not arrested by the measures then adopted, and instructions have been given to have the entire surface of the ground covered with broken stone.

The light-house at Minnesota Point having been found to require considerable repairs, prompt measures to this end were accordingly taken.

The special estimates submitted last year for necessary protective works for the light-house at Waugoshance shoal, Straits of Mackinac, having failed to receive the sanction of Congress, nothing could be done toward arresting the increasing dilapidation and decay at this station, which, in point of importance to the interests of navigation, is second to none in the lake region. The pier surrounding the light-house, and designed for its protection, is in course of rapid destruction, and when once destroyed, the light-house must give way. Because of the exposed position, the works required at this point are of a very expensive character, and after a careful study of the whole subject, the board is of opinion that, to carry out the work in a substantial and satisfactory manner, the sum of \$200,000 will be required, but has thought it expedient to estimate for only a part of this amount, (\$90,000,) to be expended during the year ending June 30, 1866.

A fog-signal is more needed at this point than at any other on the lakes, being the turning point of all vessels passing through the Straits of Mackinac. A special estimate for its establishment is submitted.

The necessity for establishing a system of range-lights at St. Clair Flats has been brought to the attention of the board, and has received careful consideration. Deeming these ranges of manifest usefulness, a special estimate is submitted.

The importance of substituting new and efficient fog-signals at various stations in this district, in place of the bells now in use, has been developed, and a special appropriation is asked to cover the expense.

A light-house at or near old Fort Mackinac is much needed to enable vessels to pass through the straits at night, and McGulpin's Point, about two miles distant, is designated by the engineer of the district as the most suitable location. A special estimate is accordingly submitted.

The most salient point on the eastern shore of Lake Michigan, between Point Betsey and Muskegon, is known as Grand Pointe au Sable, and is unmarked by night. It is a principal landmark for day navigation, and it would seem that the interests of commerce demand that it be suitably lighted. A special estimate is submitted.

The extension of the pier at Chicago during the past summer for a distance of 450 feet into the lake renders it necessary to build a small beacon-light at the end of the pier to mark it.

The light-house tower at Kenosha is found to need extensive repairs. The inner wall is literally crumbling to pieces, and the outer wall also shows several

cracks, caused by the action of frost, as in the case of the tower at Presque Isle, Pennsylvania. A special estimate of the cost of these repairs is submitted.

A light-house at Eagle Bluff, on the east coast of Green bay, is much needed to enable steamers plying between lake ports and the port of Green Bay, which use the east channel almost exclusively, to pass between the Little Sister island and the Frying Pan shoals. It is the most prominent bluff on the western shore of Green bay. For the erection of this light a special appropriation is recommended.

The Grand Island light-house was found, upon examination, to be in a wretched condition, on account of the inferior materials employed in its original construction. This structure, which is difficult of access, should be rebuilt in the most substantial manner, so that no further repairs will be required for many years to come.

The existing appropriation of \$6,000 for lights at the two entrances of Grand Island harbor, Lake Superior, having been found insufficient to carry on the work, an additional appropriation is respectfully recommended.

A special estimate is also submitted to cover the cost of expensive repairs and renovations found to be necessary at Marquette light-house station.

The Huron islands, Lake Superior, lying as they do in the track of vessels bound to the Portage, are a constant source of anxiety to the navigators, wrecks having frequently occurred at this point. The large and rapidly increasing commerce passing this point warrant the establishment of a suitable light and fog-signal, for which an appropriation is accordingly recommended.

A pier having been built at the mouth of Portage river, and the channel straightened and deepened, a small light is needed to mark the entrance.

A special appropriation is likewise recommended for the establishment of a light-house to mark the channel between Keweenaw Point and Manitou island, Lake Superior, a dangerous passage, at present unmarked by a light, which is deemed very necessary.

Estimates of expense of certain essential works of rebuilding at Copper Harbor and Ontonagon light-stations are submitted.

A special committee of the board was sent to the northwest lakes to ascertain the wants of commerce in that locality. The examination was particularly directed to Green bay and surroundings, and a special estimate to cover the cost of certain necessary aids to navigation, which will comprise a third class light-house on Mahnomah or Chambers island, range-lights at entrance to Fox river, a beacon on Peshtego shoal, &c., is submitted.

The twelfth light-house district embraces the entire Pacific coast of the United States. The various lights and buoys have been kept in an efficient condition, and no complaints on this score have been received.

The failure of Congress to provide at the last session for certain new works for which special estimates had been submitted has confined the engineering work of the district to ordinary repairs and renovations, and preparations for the new works when the necessary special appropriations shall be available.

The buoyage of the district has been well attended to.

The new light-house at Ediz Hook has been completed and lighted.

Having thus given a detailed account of the operations and condition of the light-house establishment in the several districts, there remain but a few matters of general importance to notice.

In anticipation of the ultimate overthrow of the rebellion, and the consequent necessity of providing as promptly as possible for a sudden revival of trade to southern ports, the board took measures to provide ready for use when required, a number of lanterns of the various classes, the lenses having previously been provided as heretofore reported. These, having been constructed, were, after careful inspection, received and stored.

The board has had good reason to congratulate itself on having taken this

timely precaution, being thus enabled to hasten materially the re-establishment of lights at many stations where the lanterns had been destroyed by the enemy.

In like manner the board provided for a supply of iron buoys of the several classes and sizes, being thus prepared, on the restoration of trade to any particular port, to re-establish the necessary buoys. These buoys are now in course of construction by contract, at favorable rates to the government.

Upon the close of the war, instructions were given to the acting light-house engineers in the southern districts to inquire for, and recover if possible, the light-house property, comprising illuminating apparatus and other material which had been scattered during the hostilities. This work has been, in a great measure, successfully accomplished, and mainly by the action of the War Department, through which much valuable material has been reclaimed. The apparatus recovered has been forwarded to New York for repairs, being in most instances considerably damaged. That which was fit for immediate use has been either so applied or stored until the towers were in a condition to receive it.

Under sanction obtained from the department an arrangement was made with the Navy Department for the transfer to this board of some small steamers which had been advertised for sale, to be used as light-house and buoy tenders. These steamers, six in number, are to take the place of a larger number of small and inefficient sailing vessels. This arrangement, though attended with some immediate additional expense, will ultimately prove beneficial and economical.

The board has, during the year, given its earnest consideration to the use of lard oil. A large quantity was purchased under contract and distributed to the lights which are fitted with lamps adapted to its use, and the board has yet to record the first case of well-grounded complaint on the part of keepers of the lights so produced, or on the part of mariners. The board is therefore much encouraged in its hope of introducing a cheaper and more certain article of illumination than sperm oil, which has now reached a price far beyond the reach of ordinary appropriations, while the continuance of the supply is a matter of great uncertainty. It is true that lard oil is at present unusually scarce, yet this is only a temporary condition, which, in consideration of the abounding means of supply, cannot long exist.

Very respectfully,

W. B. SHUBRICK,
Rear-Admiral, Chairman.

ANDW. A. HARWOOD,
O. M. POE,
Secretaries.

APPENDIX.

LIGHT-HOUSE OFFICE, 3D DISTRICT,
New York, October 25, 1865.

SIR: In compliance with your instructions of October 3, I have the honor, in connexion with the acting light-house engineer of this district, to make the following report of the condition of the light-house premises, sea-wall, &c., at Staten Island.

The grounds are still occupied by the cotton agent. The closing sales, however, have taken place, and there is prospect of the premises soon being in our hands again.

Referring to my annual report of this year, you will perceive that the boundary fence, dividing the light-house grounds from those of the revenue depot, is about one-half completed, and stands as the contractors left it—thirty feet six inches within the line assigned as the southern boundary of the light-house grounds by order of the Treasury Department, and encroaches to that extent upon our

premises, viz., taking away a strip of land 630 feet in length by thirty feet six inches wide.

The only approach to the light-house grounds, except by courtesy, is by water. On the south is the revenue depot; on the north and west are the State lands. Access to the public street can be obtained on the north by the purchase of the strip of land which lies between the light-house grounds and South street, Tompkinsville, twenty-nine feet and one-half inch wide. Negotiations for the purchase of this strip of land have been entered into; and, as the board are aware, the land commissioners of the State have placed it at the disposal of the United States for the sum of \$6,000.

The sea-wall, which was intended to protect the whole water front on the east and north, is, and was received, in a very defective condition from the hands of the contractors. It is not high enough by two feet. This wall was thrown down during the first gale after its completion, and rebuilt in the same manner as at first, and is now in a falling condition; the stones are not laid in regular courses as required, nor are they of a suitable size, or well bedded. The wall is entirely unfit to keep the filling from washing out; large quantities of earth have gone through and filled the basin in front, so that the buoy tender cannot enter or leave except at high tide.

The sea-wall bounding the water front on the north, through some error in establishing the boundary, is placed thirty-three feet too far to the south of the true boundary line. This wall, if removed to its proper position, will leave a space to be protected on the east for thirty-three feet by a continuation of the sea-wall on that water front.

The grading of the grounds has not been completed in accordance with the contract. The new filling has not been gravelled, and that portion which has sifted through the walls has not been replaced. The grounds in front of the storehouse need filling in with two feet of earth to bring them to the proper level of the sea-wall when raised.

The stone pyramids supporting the landing wharf were left without repairs by the contractors; some have entirely disappeared—others are in a falling condition, so that it has become a necessity to drive piles to support the wharf. Unless soon repaired the other stone pyramids will likewise fall into decay.

The roadway connecting the landing wharf with the shore is one foot nine inches lower than the former, and an inclined plane is necessary on this account. The roadway, although constructed in accordance with the contract, (excepting the piles which support it, which are from one to three inches less in diameter than called for,) is too lightly built for the heavy buoy service, and not strong enough to withstand the action of the sea and floating ice in winter. No fender-posts have been provided by the contractors, but were supplied by the cotton agency in part, and by the acting engineer.

No boat-house has been built for the service of the light-house establishment, though one was promised by the supervising architect of the Treasury Department in his letter to Professor Joseph Henry, dated June 24, 1863.

Plans and estimates for meeting the requirements resulting from the present condition of the light-house premises, as stated herein, have been made by the acting engineer, and forwarded to the Light-house Board with my approval; and very full reports relating to the above have been sent to the Light-house Board from time to time by the acting engineer and myself, as well as a report of the special commission appointed by the Treasury Department.

I respectfully submit this report of the present condition of the light-house premises, sea-wall, &c.

Very respectfully, your obedient servant,

L. M. POWELL,

Light-house Inspector, 3d district.

Rear-Admiral W. B. SHUBRICK,

Chairman Light-house Board, Washington, D. C.

REPORT OF THE LIGHT-HOUSE BOARD.

TREASURY DEPARTMENT, OFFICE OF THE LIGHT-HOUSE BOARD,
Washington City, October 16, 1866.

SIR: I have the honor respectfully to submit a report of the operations and condition of the light-house establishment for the year ending September 30, 1866.

FIRST DISTRICT.

The first light-house district extends from the northeastern boundary of the United States to Hampton harbor, New Hampshire. The service in this district has been well attended, and the various aids to navigation have been maintained in a condition of high efficiency.

The light-stations generally are in excellent condition, needing only some repairs and renovations of minor importance and inexpensive in character, which will be attended to as opportunity offers.

The various fog-bells, established for the guidance, during thick weather, of mariners along this rocky and dangerous coast, have rendered as useful service as their character would permit. The board, however, being impressed with the necessity of erecting some apparatus capable of producing more effective signals, applied for and obtained, at the last session of Congress, an appropriation for establishing at the outlying stations such improved apparatus as careful scientific research and experiment might indicate as best adapted to the purpose.

To this end the board has directed its closest attention; but the practical difficulties to be overcome are such that it has not yet arrived at a definite conclusion. It is, however, encouraged to hope that before the close of next season to have established such a system of ear-signals as will meet the requirements of commerce.

The buoyage of the district has received its full share of attention; and though attended on this coast with more than ordinary difficulties, it is believed that the wants of navigation have been, as far as possible, complied with. The loss of buoys by ice is very considerable, requiring constant watchfulness and heavy expenditure to keep the stations properly marked. A large iron buoy belonging on Hue-and-Cry Rocks, entrance to Portland harbor, having been removed by some cause from its station, was recovered by private parties, taken into port, and an extravagant claim for salvage set up. The propriety of the claim being resisted by the board, the property has been libelled in the United States district court, and judgment given for the claimants. A recognition of the right on the part of private parties of libelling government property would, in the opinion of the board, establish an inducement to evil-disposed persons to set buoys adrift in order to secure pecuniary profit.

The steam tender provided for the district has proved herself a most valuable auxiliary for the prompt performance of duty, and the board hopes that, after some little further experience, this branch of the service will be reduced to a systematic and rigid economy.

The board regrets to report a very heavy loss incurred by the light-house establishment in the destruction, by the great fire in Portland on the fourth of July last, of the offices of the inspector and engineer of this district, together with all the archives, papers, and instruments, rendering for some time the discharge of the duties a matter of unusual delay and labor.

SECOND DISTRICT.

The second district embraces the coast from Hampton harbor, New Hampshire, to Gooseberry Point, Massachusetts.

The various aids to navigation in this district are reported to be in a state of usefulness commensurate with their character.

Nearly all of the light-houses in this district have been overhauled and put in as good order as circumstances would permit, most of them requiring slight

and inexpensive renovation. A few cases of requisite repair of unimportant character yet remain unattended to, their accomplishment being deferred to next season on account of difficulty and expense of procuring labor and materials. This postponement will not be attended with any injury to the service. Other works of renovation, more or less extensive, are yet in progress and will be completed if possible, this season. Others are yet necessary which will receive due consideration.

At Minot's Ledge light-station a new gun-metal deck is needed to cover the present stone deck, which has been cracked by vibration of the lantern posts, due to the unusually exposed position. Some other modifications of the original plan are also found to be necessary.

On the 18th March last, the Nantucket light-vessel, during a storm, parted her moorings, and reached New Bedford safely on the 29th. Advantage was taken of her presence in port to complete certain repairs to hull, rigging, &c., which had been found necessary.

On the 18th of June the Vineyard Sound light-vessel was driven from her station into New Bedford, her place being immediately occupied by the Relief. She was found upon examination to be very much out of repair, so much so that had she not been driven in she would have been in danger of foundering at her anchor. During the progress of these repairs more extensive defects than had been anticipated were discovered, and the proper remedies applied.

The necessity of renovations to the Succonesset, Shovelful shoals, and Handkerchief light-vessels having become apparent, they were withdrawn from their stations, thoroughly overhauled, and replaced.

The Pollock Rip light-vessel is evidently much out of order, and so soon as the services of the Relief are available to take the station, she will be brought in for repairs.

An appropriation having been provided by Congress for a light-house or light-vessel to mark the Hen and Chickens reef near Cuttyhunk, Buzzard's bay, Massachusetts, a careful examination has been made of the reef and its surroundings, with a view to determine as to the best aid to navigation at the point.

This survey has led to the conclusion that a light-vessel, suitably fitted, will render the best service within the means available. The necessary steps have been taken to establish immediately a light-vessel now on hand, and measures will be instituted to construct, out of the appropriation, a vessel to replace the one thus made use of.

No casualty has occurred to any beacon during the year. All cases of requisite renovation have been attended to as promptly as possible.

The fog-signals have been maintained in as thorough a state of efficiency as is consistent with their nature and without repair, except in the case of the caloric engine at Cape Ann, all, with this exception, being fog-bells struck by machinery.

The numerous buoys have been carefully attended to, and have rendered material aid to navigation.

The steam tender provided for this district has performed valuable service.

THIRD DISTRICT.

The third light-house district embraces the coast from Gooseberry Point, Massachusetts, to Squam inlet, New Jersey, including also Hudson river and Lake Champlain.

The service in this district in all its branches is in a satisfactory condition.

During the season now closing, repairs, more or less extensive, have been completed on eighteen stations, including the beacons, and stone pyramids at the landing of the light-house establishment depot at Staten island, namely: At Stony Point, Montauk, Fort Tompkins, Stratford Point, Throg's Neck, Waackanack, Sandy Hook, Fire island, Highlands of Navesink, Prudence island, Old Field Point, Black Rock, New Dorp, (Staten island,) Little Gull island, Bridgeport beacon-light, Bridgeport harbor beacons, Southwest Ledge beacons, and the landing wharf at the light-house establishment depot.

The piers built last season for the protection of the site of the light-house at Block island have answered the expectation of the board by arresting the encroachment of the sea, which, by washing away the sand from the tower and dwelling, had endangered the structures.

The sea-wall at Nayat Point light-station has been substantially repaired.

The new beacons authorized for Connimicut and Bullock's Point, in Providence river, and the tower and keeper's dwelling at Split Rock, Lake Champlain, have been under vigorous construction, and it is hoped that they will be completed before the close of the present season.

The stake lights at Whitehall narrows have been destroyed by ice and colliding rafts. Plans for their replacement have been adopted, and will be carried into effect so soon as the proper season arrives.

A petition, numerously signed by masters and owners of vessels, has been received, asking that so soon as the stone beacon at Connimicut Point shall be completed a light be exhibited therefrom, and that the light now at Nayat Point, directly opposite on the mainland, be discontinued. This matter has received the careful consideration of the board. Meanwhile a wooden day mark occupies temporarily the place of the iron one it is designed to put at Connimicut point.

It is hoped that the foundations of Rondout and Cossackie light-houses will be laid before the winter sets in, and that the materials will be ready to insure the completion of the work next season.

The repairs, &c., at Sandy Hook will be completed, and the new fog signal authorized for this station will be put in operation during this autumn.

Arrangements have been made for prosecuting needful renovations at Crown Point, Windmill Point, and Lloyd's harbor.

At Bergen Point a much needed lantern deck will be put up as soon as it can be obtained from the foundry, and the work authorized at Beavertail, Rhode Island, will be completed if the lateness of the season does not prevent.

Nothing as yet has been accomplished towards the improvement of the condition of the light-house establishment depot at Staten island beyond repairing the ice-breakers.

The imperfect manner in which the sea-wall was built by the late supervising architect of the Treasury Department rendered the basin in front almost useless as a harbor for the buoy tender. The washing out of the earth-filling from behind the wall is still going on, gradually diminishing the depth of water in the basin. The tender now can only enter or leave the basin at the very top of high water, a state of things highly detrimental to the service. The roadway leading to the landing wharf is liable to be carried away on the occurrence of the first severe storm, and has been kept thus far in place only by the ballast placed on it for the purpose of saving it as far as possible. These evils require immediate correction.

Since the establishment of the depot the work has gradually increased so as to require more room for storage than the present storehouse affords. It became necessary to store much valuable property in two sheds, which remained on the ground when the property was assigned for light-house purposes, but though the material of one of these sheds has been used in repairing the other, which is now nearly filled with goods belonging to the light-house establishment, it can only be considered as a temporary shelter. An estimate is submitted for the necessary workshops to the establishment, which will leave sufficient room for the storage of all this material in the warehouse, which, in order to avoid the risk of fire, must be separate from the workshops.

An appropriation is also required for a permanent shed large enough for keeping the annual supply of coal for the various light stations of the district and for the use of the steam tender, to be placed on the wharf, where it will be convenient for distribution and avoiding the unnecessary expense of cartage. In connection with this shed it is contemplated to erect a covered space for

making spar-buoys in winter and during bad weather, to serve as a carpenter's shop and for housing boats, the storage of seasoned lumber and of articles landed temporarily and intended for early reshipment.

Estimates are also offered for the establishment of oil vaults of sufficient capacity for the safe storage of the annual supply of oil. This is a facility the want of which has been much felt, and which will materially lessen the expense of handling and leakage.

In connection with the operations at the depot may be mentioned that thirty-four sets of light-house illuminating apparatus have been received there from the southern coast in a damaged condition during the past season. These have been examined, and a little more than one-half being found susceptible of repairs in the shop, have been put in order; the rest have been sent to the makers in France for renovation.

A new light-house having been authorized for Race Rock, off Fisher's island, at the eastern entrance to Long Island sound, plans for the structure are under consideration.

The Statford Point light-vessel slipped her chain in December last before the pressure of heavy ice, with the loss of her moorings. She was replaced on her station with new and improved moorings, and it is hoped that she will be able to remain at her post during the coming winter.

The Brenton's Reef light-vessel was blown ashore October 19, 1865, during a heavy westerly gale. She was driven clear over the reef and lodged on the rocks. Her station was immediately occupied by the Relief and vigorous steps taken to save the old vessel. She was finally, by a concurrence of favorable circumstances, got off and towed, badly injured, into Newport harbor, where she was repaired at heavy expense. She was put in excellent condition and replaced at her station.

The Cornfield Point light-vessel was, on the night of June 5th, run into by a New London steamer during a heavy fog, and sustained thereby considerable damage. She was repaired at an expense of about \$3,000, and replaced on her station.

The buoy and beacon service of the district has been well attended. But few iron buoys have been lost during the past year, and in all cases have been recovered on suitable reward, and replaced.

The channels in Seekonk river, Rhode Island, under authority of Congress, have been properly marked by buoys.

The spindle on Southwest ledge, off New Haven, Connecticut, which had been carried away, is replaced in as complete a manner as was practicable under the circumstances.

The spindle at Rose island, in Narraganset bay, has been repaired and a new day mark added.

The rebuilding of the beacons at Norwalk, Southport, and the Elbow has been authorized, and the work will be completed in due course.

The steam tender Putnam, assigned to this district, has been altered to meet the requirements of the service, and has proved of the greatest assistance, and has been the means of saving much expense of towage, &c.

Special appropriations for which estimates are submitted are needed for the following works in this district:

1. For the entire reconstruction of the tower and keeper's dwelling at Cumberland Head. At this station the growth of forest trees to the north and east renders the light invisible, except from the south, thus materially curtailing its usefulness. The most feasible remedy in this case is to remove the light to another position. The present condition of the structure, badly built originally, and of insufficient height, will, in any event, render it necessary to erect a new building in a very short time. A suitable site for the new light is already in the possession of the government.

2. For new lanterns of the beacon pattern for the Burlington beacons, to enable the keepers to reach the lantern from the inside, and attend to the lights under cover.

3. As a buoy depot is required at Saugerties, on the Hudson, instead of expending a large sum on the repair of the old house, which is in a very advanced state of decay, it is deemed expedient to rebuild this establishment on the plan adopted for Rondout and Coxsackie, and to retain a sufficient part of the present dock for a buoy depot.

4. For the reconstruction of Stuyvesant light-house, which it is proposed to rebuild upon a similar plan. This is an old wooden structure, badly decayed.

5. For new lantern, with iron deck-plate, and other repairs to the tower; and for a keeper's dwelling at Execution Rocks; and for a powerful fog signal in the place of the present small bell, which is rung by hand, and is entirely useless.

6. The sea-wall at Sand's Point station continues to yield to the action of the water, and measures are in progress for overcoming the difficulty by the use of jetties, which has elsewhere been productive of good results. The reconstruction of the keeper's dwelling at this point has become a matter of urgent necessity, and the board is desirous of carrying on this work in connection with the work of protection just alluded to.

7. For rebuilding tower and keeper's dwelling on Great Captain's island, Norwalk island, and Old Field Point, which are all in a dilapidated condition.

8. For covering the old tower at Eaton's Neck with an iron deck-plate, and substituting an iron parapet for the present brick parapet, which leaves the pyramid unprotected, and, not being properly covered by the lantern, admits the rain. The wooden lining of the parapet, which was refitted in 1858, is already rotten, and the stonework has sustained much injury by this deficiency. It is also desired to replace with iron the present wooden stairs, landings, and window frames, which have decayed, and to rebuild the old dilapidated part of the keeper's dwelling to correspond with the newer structure, which is in good condition.

9. For similar repairs of a permanent character, substituting iron for wood in the stairs, landings, and window frames, at Little Gull island. All the steamers whose destination is beyond New London pass this light in the night, and it is necessary to enlarge the tower so as to allow of the substitution of a second order lens in place of the present third order apparatus, which is not sufficiently distinguishable. A more powerful fog-signal is also indispensable at this station.

10. For rebuilding light-house at Cedar island, on the plan adopted for Rondout, on Hudson river. The tower is in a very bad condition, and requires rebuilding; but the island is gradually wasting away under the action of the sea, notwithstanding the attempted protection by pile planking, and the cost of an effectual remedy would largely exceed the expense of a building with a protecting pier, such as it is proposed to construct.

11. For rebuilding the tower and keeper's dwelling at Morgan's Point, on the Mystic river, which were strongly recommended to be rebuilt in 1863.

12. For a new lantern, iron deck-plate, stairs, and window frames at Point Judith.

13. For necessary renovation and repairs at Black Rock, Plum island, (Long Island sound,) Princess bay, on Staten island, and Point au Roche, on Lake Champlain.

14. For an additional appropriation for the purchase of North Brother island, and the construction of suitable tower and store room thereon. The owner of this island refuses to sell part for a light-house site, but will dispose of the whole of it. The dwelling and farm building on the island will amply accommodate the keeper and his family.

15. Nothing has been done towards building a light-house on Hart island, for which an appropriation was made by Congress during the last session. The owner of this island also refuses to sell anything but the whole of it, for which he demands a price entirely above the means at the disposal of the board.

16. For transferring the light from Nayat Point to the Connimicut beacon, is Providence river, which involves the elevation of the structure, in order to keep the light at its present focal plane, and providing a suitable lantern and watch-room.

FOURTH DISTRICT.

In the fourth light-house district, embracing the coast from Squam inlet, New Jersey, to Metomkin inlet, Virginia, and including Delaware bay and its tributaries, the light-houses, beaconage, and buoyage are reported in a satisfactory condition.

At Barnegat the beach from the nearest point to the light-house has been washed away by the sea within the last year, and the distance from the high-water mark to the base of the light-house is reduced to 153½ yards. A small party of workmen are now employed in placing brushwood jetties along the beach of the inside bay, in the neighborhood of the light-house, to prevent the further wasting away of the sand, and to project the line of the beach further out. On the 24th of September the overseer of the work reports that up to that time twelve pilings had been finished, and seven of them filled with brush. These jetties are placed one hundred feet apart, and are carried out at right angles with the shore from high to low water. Should this expedient to prevent the encroachment of the sea prove successful, and the low-water line be pushed further out, it may be advisable to carry the jetties still further.

At Absecom light-station the measurements of the beach near the light-house, to ascertain the encroachment of the sea, have been continued semi-monthly during the year. No changes of importance have taken place since the last annual report, but a small appropriation is asked for to meet any contingency at this station.

At Cohansey light-station the buildings have been protected from the encroachment of the sea by a new earth-bank enclosing them, the outside face of which is faced with stone. This enclosure having been properly ditched and drained, the ground is becoming dry and solid, and the station is materially improved by the embankment.

Fort Pier light-station. The wharf-logs and piles of this pier having decayed, such temporary repairs have been put in hand as are required to place it in safe condition. The state of the pier is such, however, that its entire reconstruction from low water will be needed in a short time.

At Assateague the work is going on in a satisfactory manner. During the year the preliminary works erected in 1860 and 1861, such as the wharf, plank-road, and workmen's quarters, which had decayed, have been repaired, the old masonry has been removed, new foundations established, and on the 1st of September the new tower of brick-work had reached the height of thirty-seven feet. The work will be continued as long as the weather will permit.

To meet the requirements of navigation occasioned by alterations in the channels and other causes, certain changes have been made in the buoyage of the district. In December last, at Barnegat inlet, the buoys were shifted from the south to the north channel, and in May No. 3 buoy was discontinued, being no longer required. In April the spherical buoy at the entrance of Little Egg harbor was changed to a first-class can-buoy. In August a spar-buoy was substituted for the third-class nun-buoy No. 29, and three additional spar-buoys were placed in the eastern channel of the Pea Patch.

Estimates are furnished herewith for the repairs required for the various stations of this district. These, though not extensive, are essential, and consist chiefly in the restoration of roofing, fencing, glazing, cisterns, and in coating the towers of light-houses with cement wash. An estimate is added to enable the board to substitute a screw-pile structure for the present light-house at Egg island. The present building, it is judged, will not remain in a serviceable condition for a much longer time than will be required to complete the structure which it is proposed to erect in its place.

The iron stairway authorized by act of Congress for the light-house at Cape Henlopen has been constructed.

FIFTH DISTRICT.

The fifth light-house district embraces the coast from Metomkin inlet, Virginia, to New River inlet, North Carolina, including Chesapeake bay and tributaries, and Albemarle and Pamlico sounds. All the light-houses in this district, excepting the few temporarily extinguished, are in serviceable condition, and complaints in regard to the regular and proper exhibition of the lights are of rare occurrence.

In consequence of the gradual washing away of the ground on which the old light-house at Sharp's island is built, it became necessary to remove all the furniture from it, including the illuminating apparatus. Hence, from the 1st to the 15th of November, 1865, no light was exhibited from this point. Meanwhile, a tripod of wood-work was constructed, and a steamer's lens established on it, which was exhibited on the night of the 16th of December. This temporary appliance will be continued until the new tower now in progress is finished. The light-vessels of this district, since the last annual report, with a single exception, have required no expenditure for repairs, except for paint to preserve the wood and iron work.

In the Hooper's Island light-vessel a leak has been sprung, the extent of which cannot be ascertained until she is removed to winter quarters, when it may be necessary to haul her up on the ways. Repairs will be required to her upper works and windlass in addition to those rendered necessary by the leak.

The Long Shoal light-vessel is in a very defective condition; it is, however, not recommended to remove her for repairs, as she may still keep her station until the screw-pile structure now in progress to supply her place is completed.

In April last, the hull of the Willoughby Spit light-vessel was found to have become so thin at the water-line by gradual scaling, as to make it necessary to employ machinists and material to repair her. She is now considered to be in serviceable condition for another year.

The buoyage in this district is in a satisfactory condition, so far as it has been possible to re-establish it, and the work of replacing those buoys which had been removed during the war has been pushed with all available means.

The buoys in Hatteras inlet, Beaufort cove, Albemarle and Pamlico sounds, have already been replaced, and as soon as the spar-buoys which have been contracted for are delivered, the tributaries will be put in the same condition.

In Chesapeake bay, the buoyage is believed to be complete. The Patapsco, York, and James rivers have been supplied, and the work will be extended as fast as practicable to the rivers on the eastern and western sides of the bay.

In prosecuting this important work, the services of the steam tender Heliotrope have been in constant requisition, and that vessel has proved to be of the greatest service to the board, in the work of restoration.

As soon as she can be spared from duties which cannot be postponed, the buoys will be replaced on the eastern shores of Virginia. There will then remain the unfinished work in the sounds of Albemarle and Pamlico and their tributaries to be attended to, and as certain repairs to the Heliotrope are both necessary and urgent, it is desirable that an additional vessel should be employed in the work without delay.

Since the last annual report, one thousand and twenty-one tons of iron ore have been excavated from the grounds at Lazaretto Point, Maryland, for which the sum of fifteen hundred and ninety-two dollars has been received and transferred to the superintendent of lights at Baltimore, Maryland, and Norfolk, Virginia. The work is going on in a satisfactory manner, and promises a continual supply of ore for some time to come.

It will be seen by comparison with the statement made last year on the subject, that three hundred and one tons more of iron ore have been produced this year than during the last.

The hollows made by the excavation are systematically filled and brought to a level with the adjoining property.

SIXTH DISTRICT.

The sixth light-house district extends from New River inlet, North Carolina, to Cape Canaveral, Florida.

The service, as far as practicable, has been well attended, but the damage sustained by lights and buoys during the war was so severe and general that some little time must necessarily elapse before the system can be approximated to that of 1860.

The building used for exhibiting a light at Bay Point, South Carolina, (formerly a barrack,) was destroyed by a tornado on the 29th May. A temporary wooden tower has been erected, and a light is now exhibited as usual.

The work of re-establishing lights destroyed by the rebels, involving in many cases considerable rebuilding, has been vigorously prosecuted, and the following lights have been re-exhibited: Fig island, Oyster Bed beacon, Cockspur island, the Bay light at Savannah city, and five temporary frame beacons have been placed to mark the course of the channel in Savannah river.

Operations were commenced at Tybee light-station preparatory to rebuilding the tower and keeper's dwelling. The works progressed satisfactorily until the 18th July, when all labor was interrupted by panic among the workmen, caused by the arrival of a detachment of United States troops on the island, with cholera prevailing among them. The foreman in charge of the work and four of the mechanics died of the epidemic, and the work was suspended. The troops while on the island did much damage to the light-house establishment; an additional appropriation for this work is therefore desired. It is proposed to recommence operations at this station in a few days.

The temporary skeleton tower and steamer lens erected at Fort Sumter have been removed, and a more permanent work substituted. The present structure consists of a substantial frame tower enclosed, carrying a fifth-order lantern and lens. A similar substitution was made at Castle Pinckney light-station.

The first class sea-coast light at Cape Romain has been re-established, with new lantern and apparatus. The tower and keeper's dwelling have been thoroughly renovated and repaired.

A keeper's dwelling, with lantern on top, has been erected at Oak island, mouth of Cape Fear river; also a frame skeleton tower placed on a tramway in front of the keeper's dwelling to serve as a range in crossing the bar, western entrance to Cape Fear river.

Under authority of the department the light temporarily exhibited at Bald Head, Cape Fear, was discontinued, the apparatus and lantern being sent to New York for one elsewhere.

A new light-house has been erected at Federal Point. It consists of a keeper's dwelling, with lantern on top, on a screw-pile foundation.

The Frying Pan Shoals light-ship broke from her moorings in January last, and was taken into Charleston. She was repaired, losses supplied, and replaced on her station. She has quite recently gone adrift again, and has not yet been recovered.

The light-ship at Charleston bar has been supplied with heavier moorings. Some slight repairs are required to this vessel.

A sunken light-vessel in Cape Fear river was recovered by a wrecking party, and turned over to the board. She was found to be in good condition, and is now refitting at Wilmington, North Carolina, for further service.

The buoyage of the district has been attended to as far as the means at hand would permit.

The tender DuPont belonging to this district having been found too small for the proper performance of the duty required of her, a larger and more suitable vessel has been transferred to this from the fifth district.

SEVENTH DISTRICT.

The seventh district embraces the coasts of Florida from Cape Canaveral to Egmont key.

The lights on this coast have been kept in useful operation as far as re-established, and no efforts have been spared to restore the system of lights to its original status. This, from the nature of the case, has been attended with unusual difficulties, arising from scarcity of materials and labor. The district has been visited during the year by several severe hurricanes, from which much injury to the aids to navigation has been sustained.

During the prevalence of a hurricane on the 23d of October, 1865, the buoys from East Triangle, Whitehead Spit, Crawfish shoal, in the southwest channel, and the bar buoy in the northwest channel, were driven from their stations. They were, however, promptly replaced. Many of the boats provided for the use of light-house keepers in the district were torn from their moorings and lost. The light-house buildings at Key West sustained considerable damage, which was repaired. At Sand Key light-station the boat-house, ways, and stores were entirely destroyed. The island, together with everything on it except the light-house tower, was washed away, but its formation soon after recommenced. A new boat-house and ways has been provided.

The vessel provided for the service of the engineering branch in this district, which was freighted with a miscellaneous cargo of building materials at Portland, Maine, encountered on her voyage to Key West a storm of unusual severity, and reached Key West with a loss of both masts and rigging, the mainsail and jib, and nearly all the cargo. The skill, energy, and perseverance of the captain and mate, aided by a good crew and two carpenters, were, without doubt, the only cause of her not being totally lost. She was overhauled and repaired at Key West, and rendered very efficient service until the 13th of April, when she was totally lost whilst in charge of a local pilot near Key West.

Thorough and extensive renovations and repairs have been made to the light-house establishment buildings at Key West, Northwest Passage, Sand key, Dry Tortugas, and Dry Tortugas harbor.

An examination of the light-house at Cape Florida, destroyed by the rebels, showed that the focal plane prism of the lens had been broken, the reflector removed, and the prism of one of the middle sections badly chipped. Many other repairs were found to be necessary. These defects were remedied, and the light was re-established on the 15th of April last.

The light-house at Jupiter inlet, which was discontinued and injured at the same time, has been repaired and renovated, and was re-established on the 28th of June.

The light at Egmont key was renovated and re-established on the 2d of June.

The light at Cedar key, (Sea-horse key,) after having been thoroughly overhauled and repaired, was relighted on the 23d of August.

The day beacons established for the guidance of navigators in Hawk channel, Sambo key, American shoal, Alligator reef, Grocker's reef, Turtle harbor, Pacific reef, and Fowey's Rocks have been destroyed. Steps will be taken to replace these important marks so soon as other more pressing work in the district has been disposed of.

The buoyage of the district has received careful attention; the work of replacing those removed and lost during the war having been kept steadily in view.

EIGHTH AND NINTH DISTRICTS.

The eighth and ninth districts embrace the Gulf coast from St. Mark's, Florida, to Rio Grande.

While those lights which had been previously re-established have been maintained during the past year in an efficient condition, the important work of restoration has been kept steadily in view, and has made satisfactory progress.

The Sabine Pass light, east side of entrance to the Sabine river, was renovated, necessary repairs made, and the light re-exhibited December 23, 1865.

The light-station at Point Isabel, Texas, has been overhauled, refitted, and re-exhibited February 22, 1866.

The light-station at Cape St. Blas was found to have sustained serious damage at the hands of the rebels. The keeper's dwelling had been utterly destroyed, the door-frames and sashes of the tower had been torn or burnt out, and other injuries of a miscellaneous character inflicted. These were repaired, a new illuminating apparatus provided, and the light re-exhibited July 23.

At Cape St. George light-station the damage sustained was hardly less serious. The proper remedies were applied, and the light re-exhibited August 1.

At Dog Island light-house it was found necessary to make considerable renovations to the foundation and station generally. The keeper's dwelling had been burnt, also portions of the stairway. Shot-holes had been made through the lantern, &c. This light has been re-exhibited.

The light-station at Pass Christian has been thoroughly overhauled, and re-exhibited August 15.

The illuminating apparatus at Merrill's Shell Bank light-station has been changed from a fifth order to a fourth order lens, the wants of navigation of the locality rendering the change advisable.

During the operations of the army and navy in the vicinity of Mobile it was found advisable to establish a small light to mark Grant's Pass, an artificial channel constructed by private enterprise, and affording a short cut between Mobile and New Orleans. This light was maintained until August 5, when the temporary structure requiring extensive repairs and reconstruction, and there being no specific authority of law for its maintenance, it was discontinued, the illuminating apparatus and fixtures being removed to New Orleans.

The light-station at the head of the passes was found to have been much injured in consequence of the brick piers supporting the gallery having been thrown down by logs washed against them. This damage might have been prevented by the keeper shoving the logs away as they drifted against the piers. This negligence on the part of the keeper was reported to the department, who promptly authorized the appointment of another person.

The light-stations at Aransas Pass, below St. Marks, have been under repair with a view to restoring the lights, and their re-establishment is looked for at an early day.

Minor repairs and renovations at the screw-pile structures at Ship shoals, Southwest reef, and Shell keys have been made.

On the 10th of January the light-station at the Head of Passes was somewhat injured by a fire. The necessary steps were taken to repair the damage.

The search for illuminating apparatus and fixtures which had been stolen and secreted by the rebels has been zealously continued, and resulted in the recovery of several apparatus and parts of apparatus at Matagorda, and various articles of supplies and fixtures at Pensacola.

Boats have been supplied to many of the stations, including those re-established.

The buoyage of these districts has been as well cared for as the necessities of other branches of the service would permit, and no pains will be spared to replace the aids to navigation of this description in their former state of efficiency.

A buoy has been placed in the channel into Southwest Pass to mark an obstruction caused by the rebel ram *Manassas*, sunk with about five feet water over her.

An iron buoy, belonging to the light-house establishment, and probably from this district, was recovered at Vera Cruz, whither it had been taken by a vessel which picked it up at sea.

The light-house establishment suffered a severe injury by the wreck and total loss on the 8th instant of the schooner *Chaos*, a tender, belonging to the eighth district. This vessel, with her outfit and cargo, was wrecked on Revenuc shoal, Mobile harbor.

The steam tender provided for the ninth district was fitted and sent to New Orleans early in the season, and rendered efficient service in transportation of supplies, building materials, workmen, &c.

The tower at Southwest Pass light-house is an old structure, for the rebuilding of which an appropriation was made in 1860, but, through reason of the war and uncertainty as to time of application, the appropriation was suffered to lapse into the surplus fund of the treasury. Nothing has been done to this station beyond what was indispensable to the temporary exhibition of the light now there. The tower has settled on one side, and is now inclined from the perpendicular.

A reappropriation of the amount turned over to the surplus fund is recommended.

The important stations at Pensacola, Sand island, and Mobile require extensive reconstruction, and for which appropriations are recommended. Smaller rebuilding will be needed at East Pascagoula, Tchefuncti river, Pass Manchac, Bayou St. John, Choctaw Point, to meet which special appropriations are urgently recommended.

While the board has reason to congratulate itself on having accomplished so much towards re-establishing the system of lights and buoys which prevailed in 1860, it would add that a very serious limit to its operations has been found in the continued scarcity and high prices of mechanics and materials in these districts, an evil which it is hoped will not extend beyond the present season.

Steps have been in progress for the re-establishing of range beacons to mark the entrance into Pensacola.

TENTH DISTRICT.

The tenth light-house district embraces the St. Lawrence and Niagara rivers, and Lakes Erie and Ontario. The aids to navigation are in good condition. The work on the stone tower building at Galloo island has been delayed by the failure of the contractor to deliver the cut stone, but the work is now being pushed so as to be completed before the close of navigation.

The repairs contemplated at Oswego light-house have been delayed by direction of the board, until the repairs to the pier of protection, in charge of the engineer department of the army, are sufficiently advanced. The work will be done as soon as the Galloo Island light-house is finished.

The repairs to Buffalo and Horseshoe light-houses, authorized under date of May 12, 1864, but postponed by authority from the board until this spring, have been made in a thorough manner at a cost of fifteen hundred and seventy-eight dollars and thirty-five cents, which is eight hundred and ninety-four dollars and forty-three cents less than the estimated cost.

As soon as the plans and estimates for the outer range lights at Cedar Point, Sandusky bay, Ohio, were approved by the board, steps were taken to procure the timber required for the work, but it was found that it could not be obtained for anything like the price estimated, nor in time to sink the cribs during the months most favorable to the prosecution of such work. It was therefore thought best to postpone the work until next season, and to purchase the timber in the winter, when it can be obtained on more favorable terms. The temporary range erected at this island has answered a good purpose, and is still in use.

The light-house buildings at Turtle island, for which plans and estimates were approved by the board in May last, are so far completed that the light from the new tower was exhibited for the first time on the night of September 12.

The keeper's dwelling will be ready for occupancy about the 15th of the present month.

The total cost of this new building cannot yet be correctly stated, but will not exceed the estimate.

After completing the abstracts of title for the lands required for the Maumee Ranges, it was found that further legal proceedings were required to remedy some of the defects in the title. By an order of the board in September last, the whole matter was placed in the hands of Messrs. Bissel, Glenson & Co. An additional appropriation of five thousand dollars will be needed to cover deficiencies arising from the increased cost of the lands, and the rise in the price of labor and materials since the original estimates were prepared.

The light-house on Mamajuda shoals, Detroit river, for the rebuilding of which an appropriation was made in April last, has been completed.

A former appropriation for the beacon-light on one of the Sister islands, in the St. Lawrence river, having reverted to the treasury, a new appropriation will be required for this light.

The wall of the tower of the West Sister light-house, Lake Erie, though in good condition shows dampness, and the stone coping and the lantern, which are leaky, require repairs. The wooden caps and sills also are decayed. The keeper's dwelling is in a very dilapidated condition, and the front steps and floors of the house are rotten. An estimate is therefore submitted to supply the tower with an interior brick cylinder, cast-iron stairway, stone caps and sills, cast-iron deck-plate and lantern of modern design. Also for a new keeper's dwelling after the design approved for Galloo island, to be connected with the tower by a covered passage.

An estimate is also made for the necessary minor repairs of numerous other stations in this district.

ELEVENTH DISTRICT.

The eleventh district embraces all the aids to navigation on Lakes St. Clair, Huron, Michigan, Superior, and Green bay. Several important works of renovation and repair have been in progress during the year. At the date of the last annual report, the work of raising the pier at Kenosha, (for which the re is a special appropriation,) had been commenced, and the weather proving very, favorable, the repairs were completed by the close of navigation. The beacon was erected during the present season, and is now, while the tower of the main station is being erected anew, serving as the main light, a fourth-order lens being exhibited. So soon as the main tower is completed the fourth-order lens will be returned to its former position, and the beacon will then show a fixed red light.

In order to carry out the repairs reported as being required at this station, an appropriation of four thousand dollars has been made at the last session of Congress. The tower at this station is in a very insecure condition. Plans to remedy the defects having been duly considered and discussed, the work has been pushed forward. Considerable excavation was found to be necessary in order to provide a secure foundation for the structure. The old tower has been torn down, many of the materials being servicable in the new construction.

The new beacon-light, with its pier of protection authorized for Racine, has been completed, and the light exhibited September 10. Simultaneous with the lighting of the new beacon the old main light was discontinued. A similar work has been completed at Milwaukee, and lighted for the first time on the 1st September.

These two piers (Racine and Milwaukee) have been constructed of the best materials and in the best manner, and it is hoped will subserve a useful purpose for many years. The light at Sand Point, for which an appropriation was made July 2, 1864, has not progressed as had been hoped, owing to difficulty experienced in procuring satisfactory title, a preliminary requisite in all works of construction.

The necessity for this light is considered one of great urgency, marking, as it does, the approach to the harbor of Escanaba, a place of growing commercial importance and already one of the main shipping ports of the Lake Superior iron ore. It is recommended that the light be built in a more substantial manner than was anticipated when the appropriation was made, and with this view an estimate of an additional appropriation (seven thousand dollars) is submitted.

The new light-house at Marquette is under construction, and is expected to be so far completed this autumn that nothing will remain to be done next spring but plastering and painting.

The new light-house at Copper Harbor is now nearly completed.

The new light-house at Ontonagon has been completed and occupied.

An examination of the light-station at La Pointe was made during the month of July, and showed that although the sand is yet being blown away from under the building, there is no immediate danger to be apprehended in regard to the foundation. Arrangements have been perfected to cover the threatened surface with stone, but the delivery has for some unknown reason, on the part of the contractor, been delayed.

Such light-houses as required minor repairs and renovations, painting, &c., &c., have been attended to as far as possible during the year.

The pier on which the Waugoshance light-house is located has been kept in as good a state of temporary repair as practicable, and no danger need be apprehended before a more extensive renovation can be made of the whole structure, to which end special appropriations have been provided by Congress.

The necessary examinations have been made of sites for which new lights have been appropriated, and no time will be lost in vigorously prosecuting the works.

From recent examinations the board is of opinion that the appropriation approved July 20, 1866, for additional aids to navigation in Green bay, including a light-house on Chamber's island and a beacon on Peshtigo shoal, is insufficient for the object.

A light-house on Chamber's island, of the proper elevation for a fourth-order lens, with a suitable dwelling for the keeper, and including the price of the land, would cost fifteen thousand dollars, leaving but ten thousand dollars for the other aids contemplated, one of which should be the proper marking of the Whale's Back reef, lying in the middle of Green bay, opposite Door bluff.

An appropriation of ten thousand dollars was approved July 28, 1866, for beacon-lights at the two entrances to Grand Island harbor, Lake Superior.

After careful study of the subject, and consultation with ship masters well acquainted with the channels, the board is satisfied that the following lights should be erected to enable mariners to enter Grand Island harbor at night, viz: To enter east passage a beacon-light on shore opposite to the shoal which makes out in a westerly direction from Sand Point, will be sufficient. To enter west passage a range of lights placed on the main land, in a direction south by east half east, so as to clear the shoal extending into the channel west of William's landing, will enable mariners to run this channel at night. The necessary preliminary steps to construct these works have been taken.

The usual and requisite steps have been taken to procure necessary land for the erection of the new light authorized for one of the Huron islands, Lake Superior, the most westerly island of the group having been selected as the proper site.

Application has been made to the General Land Office for the reservation of public land for light-house site between Keweenaw Point and Manitou island, the small island called Gull island having been selected.

The light-house buildings at Bois Blanc are reported to be in a very dilapidated condition. This station was established in 1839, and, is moreover, of defective style and pattern. An appropriation of fourteen thousand dollars is recommended.

The light at Skilligalee is of insufficient elevation and cannot be seen far enough to subserve the wants of navigation. It is recommended that this light be rebuilt to a height of seventy feet and a more powerful illuminating apparatus provided. An efficient fog-signal is also needed. To accomplish these desired improvements an appropriation of forty thousand dollars is asked.

The light-house at Bailey's harbor is found to be in a very defective condition, requiring rebuilding. An appropriation of fifteen thousand dollars is asked.

The necessity for a light-house with fog-signal which should be located at the extreme southeast end of the South Fox island has long been felt. Vessels coming down the lake will, with westerly winds, (which prevail during the fall,) desire to keep the west shore of the lake well aboard until they get to the vicinity of Bailey's Harbor light, when they come over to the so-called north passage, which is between North Manitou and South Fox islands. By so doing they can keep in smooth water, and have plenty of sea room in case of storm and thick weather. This they can do at night, provided a light is located as above mentioned. A light at this point would also enable them to make a lee, during northeast gales, under the South Fox island, where the anchorage is good. To accomplish this desirable object an appropriation of ten thousand dollars is recommended.

A light-house at Granite island, off Marquette, is also much needed. This island, two and a half acres in extent, is a granite rock, rising almost perpendicularly out of the lake, (Superior,) with good water all around it. The Marquette light cannot be seen by vessels coming from Portage until they are almost abreast of the light and have passed Granite island, which is directly in their track. A light-house with proper fog-signal would greatly facilitate navigation at night and during thick weather. An appropriation of twenty thousand dollars is recommended for this object.

Stannard's rock, lying about twenty-three miles southeast of Manitou Island light, is the most serious danger to navigation in Lake Superior. This shoal is about three-fourths of a mile in extent; it rises two and a half to three feet above the water, and is fifteen or twenty feet in diameter. Its exact locality is known to but few; being so far from land it is seldom seen, and is much dreaded by all navigators. The increasing commerce of the lakes will, at no distant day, demand that it be marked by a light-house, the construction of which will, from the circumstances of its location, be a serious engineering difficulty. As a preliminary to this, and to render navigators familiar with its location, the board recommend that it be marked by a day-beacon, to be composed of a single wrought-iron shaft, not less than one foot in diameter, surmounted by a cage that would be visible not less than five or six miles. This can be erected, under favorable circumstances, for about five thousand dollars; but the probable contingencies in a work of this character are so many that it is suggested that ten thousand dollars should be provided to cover all difficulties.

Sturgeon Point is about half way between Point au Sable, the north cape of Saginaw bay, and Thunder Bay Island light-house; is somewhat out of the track of the general commerce of the lake, but vessels frequently, from various causes, get out of the direct course, and a light-house at this point would enable them to take a new departure and shorten the long stretch across the mouth of Saginaw bay. To build a light-house at this place an appropriation of fifteen thousand dollars is recommended.

The general want of repairs and renovation in this district will call for considerable expenditure and activity during the coming season, but the board hopes to be able to accomplish much, if not all that is immediately pressing, of work of this character. The buoyage of the district has been well cared for, and few, if any, complaints have been made in this respect.

TWELFTH DISTRICT.

The twelfth district embraces the entire Pacific coast of the United States. The several lights and buoys have been well attended, with but few if any complaints. The light-house at Humboldt was reported to be in a critical condition by reason of the action of heavy storms and high tides. The peninsula on which this light-house stands is about a half mile wide and but a few feet above the level of the sea, and composed of loose, drifting sand. A visit to the site by the engineer of the district disclosed the fact that some considerable damage had been sustained, but not to the extent apprehended. To secure the station against the action of future floods a temporary construction was made of logs fastened together and imbedded in the sand, in the hope to thus cause an accumulation at the site. It is doubtful, however, whether any work except one of a very expensive character can permanently secure the light-house.

Under date of July 2, 1864, an appropriation was made of fifteen thousand dollars (\$15,000) for a new light-house at Cape Gregory, or Arago, near entrance to Coose bay. An iron structure of the proper character has been erected and the light will be exhibited on the 1st of November, 1866.

Considerable repairs having been found necessary to secure the foundations at Cape Hancock and Shoal-water bay stations, and other renovations being necessary, the proper steps in these cases were taken.

The fog-bell at Point Conception has been reported useless and a detriment, instead of an aid to commerce, in consequence of its elevation and the prevailing winds at that point. The attention of the board is specially directed to this matter, and upon a full investigation of all the facts in the case will be able to form an intelligent conclusion.

Complaints have been received of the want of attention to the buoys in Columbia river, and the board has sought to remedy the evils pointed out. Its efforts have, however, been frustrated through the enormous sums demanded for keeping these buoys in position by contract, and by the impossibility of procuring the services of a competent and reliable agent to superintend the work. The earliest practicable opportunity will be embraced for regulating this matter.

The service of the district has suffered during the year in consequence of the transfer of the steam tender Shubrick to the revenue service. A speedy correction of this inconvenience is, however, anticipated, the re-transfer of this vessel to the light-house service only awaiting the arrival at San Francisco of a new steamer sent out by the department to that coast.

The supply of iron buoys, provided by the board in anticipation of the overthrow of the rebellion, having proved insufficient, a contract has been entered into, at favorable rates, for the construction of a large number of these aids.

The board has continued during the year its experiments with lard oil, and with the most satisfactory results to navigation; the power of lamps thus supplied being proved to be superior to those burning sperm, at the same time at a greatly reduced expense to the government.

The Light-house Board is so organized as to insure the experience of the mariner, the skill of the corps of engineers of the army, the knowledge of the Director of the Coast Survey, and the suggestions of men of science. Proper attention is given to every suggestion intended to improve the different aids to navigation, and series of experiments instituted wherever there is a prospect of improvement on such suggestions, or from original investigations by members of the board.

During the past year further experiments have been prosecuted in regard to the materials of lighting, and a series made relative to the improvement of the fog signals now in use, and to test others which may have been proposed.

The results thus far obtained will be given in a special report from the committee on experiments.

Very respectfully,

W. B. SHUBRICK,
Rear-Admiral, Chairman.

ANDREW A. HARWOOD,
O. M. POE,
Secretaries.

TREASURY DEPARTMENT,
Office Light-house Board, Washington, D. C.

SIR: I have been instructed by the Light-house Board to have prepared and laid before the department a report supplemental to its regular annual report, which will exhibit in a condensed form the organization, the operations, and the responsibilities of the board.

The board consists of two officers of the navy of high rank, two officers of the corps of engineers of the army, and two civilians of high scientific attainments, whose services are at the disposal of the President, and an officer of the navy and an officer of engineers of the army as secretaries.

This board is properly placed under the direction of the Secretary of the Treasury, since its object is promotive of commerce, the legitimate province of this officer, and since it is only under a neutral department that the members of the army and navy can harmoniously co-operate.

The selection of proper places for light-houses on our sea-coast requires a minute knowledge of every portion of the coast, such as no person can so well possess as the head of the coast survey. The construction of light-houses, &c., on the most approved plan can with safety be intrusted only to an officer of the engineer corps; the general directions to sailors and the manning of light-vessels, the placing and equipment of light-vessels, beacons and sea-marks, require the experience of a naval officer; the testing of oils, the consideration of the various propositions for the substitution of new sources of light, for improvements in optical apparatus, in the acoustic arrangements of fog-signals, all require for their safe discussion thorough scientific training, such as is possessed only by those who have devoted their lives to studies of this character, who properly appreciate every real discovery, and who are best qualified to avoid, on the one hand, expensive and impracticable schemes; and, on the other hand, undue adherence to fixed ideas. To insure the economical expenditure of a large amount of money demands the watchful care and responsibility of a number of gentlemen of high professional standing.

Comparatively few changes have taken place in the board since its organization, except among the younger members, who have been removed from Washington on public duty. Three out of the original six members are still connected with the establishment, though the services of these officers have not been continuous, important duties connected with the naval and military operations of the country having been performed by them in addition to their service upon the light-house Board.

Under the direction of the board, all the coasts of the United States, including those of the Atlantic, Gulf, Pacific, and lakes, have been divided into twelve districts, each being assigned to the charge of an inspector detailed from the army or navy for this purpose. In addition to these inspectors, officers of engineers of the army are, on application of the board, detailed from time to time, to take charge of the construction of new and the renovation and improvement of old light-house structures.

On the first establishment of the board in 1852, a set of rules, regulations, and instructions was issued for its government, and in 1864 they were revised

and amended in the light of experience gained by the board, submitted to the honorable Secretary of the Treasury, and issued under his authority.

The board holds regular meetings on the first Monday of March, June, September, and December, and special meetings once a week.

The board has in charge 434 light-house stations, showing 489 lights, of which there are 87 beacon-lights; 39 light-vessel stations, showing 51 light-vessel lights; 500 day beacons, (approximate;) 5,000 buoys, (approximate;) 200 fog signals, (approximate,) distributed thus: 72 trumpets, 114 bells, 14 gongs, 1 whistle; 450 keepers' dwellings, (approximate;) 25 storehouses, depots, &c., (approximate;) 7 steamers; 12 sailing vessels; 434 light-house keepers; 94 assistant keepers; 39 light-vessel keepers; 52 civil employés, other than seamen and mechanics. Of the lights in its charge, 99 are sea-coast lights; 97 are lake lights; 262 are bay, river, or harbor lights; 15 are city, town, or pier lights. During the past year twenty-one (21) light-houses have been built or restored, and put in operation.

In 1862 there were in operation 320 lights, of which 7 only were fitted with Fresnel lens apparatus.

In 1866 there are 434 light-houses, all fitted with Fresnel lenses. A few range beacons, not included in the above number, are fitted with reflectors.

If the present number of lights were fitted according to the system in use prior to 1852, with reflectors of a size and number to make them similar in class and kind to the lenses now in use, there would be consumed about 160,000 gallons of oil annually, whereas the present consumption of oil is only about 60,000 gallons, with a greatly increased useful effect.

The number of lights discontinued by the rebels on the southern coasts was 164, of which 94 have been rebuilt or repaired and relighted. Those lights which remain to be re-established are chiefly small and unimportant stations; the work done comprising about four-fifths of the labor and expense of renovation originally required.

Statement of total cost of light-house establishment in the several districts under each head from 1789 to 1866.

Districts.	Light-houses and lighted beacons.	Light-vessels	Buoys, day beacons, and day marks.	Fog signals.	Total.
First district, extending from the northeastern boundary of Maine to Hampton harbor, N. H.	\$650,778	-----	\$149,796	\$67,000	\$867,574
Second district, extending from Hampton harbor, N. H., to Gooseberry Point, Mass.	1,143,419	\$153,000	244,234	18,700	1,564,353
Third district, extending from Gooseberry Point, Mass., to Squam inlet, N. J.	1,203,534	59,407	245,612	17,900	1,526,453
Fourth district, extending from Squam inlet, N. J., to Metomkin inlet, Va., including Delaware bay	880,275	30,000	59,389	6,850	976,514
Fifth district, extending from Metomkin inlet, Va., to New River inlet, N. C.	671,489	242,500	86,757	15,100	1,015,846
Sixth district, extending from New River inlet, N. C., to Cape Canaveral, Fla.	1,103,646	233,000	187,023	11,100	1,534,769
Seventh district, extending from Cape Canaveral to Egmont key	1,070,051	30,000	52,940	-----	1,158,991
Eighth district, extending from Egmont key to Mississippi river and west extremity of Lake Pontchartrain, La.	347,926	-----	31,070	4,800	383,796
Ninth district, extending from Mississippi river to Rio Grande, Texas	988,417	42,000	66,275	5,000	1,101,692
Tenth and eleventh districts, embracing the lake coasts of the United States	1,975,305	10,000	57,024	42,100	2,084,429
Twelfth district, embracing the Pacific coast of the United States	763,679	-----	38,585	15,500	822,764
Total	10,803,519	804,907	1,224,705	204,050	13,037,181

Cost of supporting and maintaining the various aids to navigation from 1789 to 1866.

Supplies	\$5,218,282
Repairs	3,779,093
Buoy service	4,925,548
Salaries of keepers	3,259,971
Seamens' wages, repairs, supplies, &c., of light-vessels	2,781,880
Commissions of superintendents	163,449
Total	20,133,223

Such is the organization, and an approximate view of the cost and value of its property, and the expense of maintaining this extensive system of lights and other aids to navigation.

It may be proper to remark, in this connection, that the light-house system of the United States is supported entirely by the government, and has been and is free to vessels of all nations without the exaction of taxes, fees, or dues of any kind for its maintenance from its commencement to this day.

All of which is respectfully submitted.

By order of the board :

W. B. SHUBRICK,
Rear-Admiral, Chairman.

Hon. HUGH McCULLOCH,
Secretary of the Treasury.

REPORT OF THE SUPERINTENDENT OF THE COAST SURVEY.

COAST SURVEY OFFICE,
Washington, October 29, 1866.

SIR: The estimates for the expenditures for the survey of the coast during the fiscal year 1867-'68 are herewith respectfully submitted, and I have the honor to request that, if approved, they may be included in your estimates for appropriations.

These estimates, as usual, state with considerable detail the progress contemplated in the several localities and in the operations of the office, and constitute the plan of work, which is adhered to as strictly as circumstances will permit.

The following is a brief sketch of the operations during the past year, recited in geographical order: On the coast of Maine progress has been made in the survey of Passamaquoddy bay and the St. Croix river; the topography of the shore of Muscongus bay, Medomak river, John's bay, Quohog bay, and New Meadows river has been completed, making the survey continuous from Portland eastward to Camden, on Penobscot bay. The inshore hydrography of the same stretch has been prosecuted so far as to admit of its completion in another working season. An examination has been made of the entrance of Saco river, with a view to the improvement of the channel.

On the coast of New Hampshire the topography has been advanced from Great Bear's Head to above Rye. On the coast of Massachusetts, from Plymouth to Sandwich. Progress has been made in the detailed survey of the shores of Narraganset bay.

On the coast of North Carolina the shore between Ocracoke and Cape Lookout has been surveyed; the shoals off Cape Lookout, and the approaches to the coast between Cape Hatteras and Cape Fear, have been sounded. Progress has been made in the survey of Pamlico sound and Neuse river.

On the coast of Georgia the bars and channels of the Savannah river have been completely resurveyed as a preliminary to the removal of obstructions and the re-establishment of the aids to navigation needed below Savannah. Soundings have been continued in the Straits of Florida. Progress has been made in the survey of Charlotte harbor, Florida, and of the coast of the Gulf of Mexico between Pensacola and Mobile Point.

The survey of the passes and delta of the Mississippi has been resumed, and progress has been made in the hydrography of Matagorda bay, and in the topography of the shores of Corpus Christi bay, Texas.

On the western coast of the United States, the topography has been filled in between Point San Pedro, and Tunitas creek, completing the coast details between Monterey and Bodega; the triangulation and hydrography of Suisun

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Tabular statement exhibiting the amount of expenditures, &c.—Continued.

Nature and location of work.	Amount authorized and expended.	Nature and location of work.	Amount authorized and expended.
CUSTOM-HOUSES.		MARINE HOSPITALS.	
New York, N. Y.....	\$42,168 49	Chelsea, Mass.....	\$26,900 00
Oswego, N. Y.....	1,065 33	Cleveland, Ohio.....	6,366 56
Portsmouth, N. H.....	150 00	Detroit, Mich.....	573 20
Portland, Me.....	2,809 24	Portland, Me.....	50 00
Petersburg, Va.....	\$182 00	St. Louis, Mo.....	5,570 72
Pensacola, Fla.....	2,243 00	San Francisco, Cal.....	125 03
Philadelphia, Penn.....	280 00		
Pittsburg, Penn.....	3,456 50	COURT-HOUSES, ETC.	
Plattsburg, N. Y.....	1,831 25	Indianapolis, Ind.....	5,728 23
Providence, R. I.....	8,298 33	Philadelphia, Penn.....	6,576 23
Richmond, Va.....	169 75	Rutland, Vt.....	252 65
Suspension Bridge, N. Y.....	30 00	Windsor, Vt.....	150 00
San Francisco, Cal.....	5,674 34	Boston, Mass.....	3,159 00
Sandusky, Ohio.....	25 00		
Salem, Mass.....	329 50	BRANCH MINT.	
St. Louis, Mo.....	15,553 09	New Orleans, La.....	2,933 98
Wilmington, N. C.....	2,351 50		
Wilmington, Del.....	155 00		
Wheeling, W. Va.....	6,541 83		
Waldoboro, Me.....	308 25		

REPORT OF THE LIGHT-HOUSE BOARD.

TREASURY DEPARTMENT, OFFICE LIGHT-HOUSE BOARD,

November 2, 1867.

SIR: I have the honor respectfully to submit for your information, and for that of Congress, the report of the operations of the light-house establishment during the last year.

In that time the substitution of lard oil for that of sperm has been completed. The whole amount purchased was 70,000 gallons.

Smaller lamps, such as those used in the light vessels, are not adapted to the burning of lard oil, especially in winter, and for these it was thought advisable to purchase 15,000 gallons of colza or rape-seed oil. This purchase was made not only on account of the better combustion of the colza in the smaller lamps during the cold weather, but also to encourage the growth of rape-seed from which this oil is produced, and which is found to flourish in the region bordering on the northern lakes. If, however, a supply of this article cannot be obtained at a price little exceeding that of lard oil, the use of it must be abandoned as a material for light-house illumination. It is thought that a slight change in the form of the smaller lamps will enable the Board to burn lard oil in these lamps as well as in those of a larger size.

The great difficulty in the way of the introduction of lard oil, and indeed in the purchase of oil of any kind, has been the want of a trustworthy method of determining in advance of actual use the true value of the article offered for acceptance in accordance with the terms of contract. This difficulty will be apparent when it is mentioned that the oil is usually delivered in casks of about fifty gallons, and as the full supply in some years will amount to 80,000 gallons, the contents of 1,600 separate casks must each be subjected to inspection; but this inspection cannot be made with certainty by the mere appearance which the material presents to the eye; it must be subjected to a series of tests which are the equivalents of actual burning in lamps of the different orders employed in the light-house service. Long experience in the case of sperm oil enabled the expert to whom the inspection of this material was usually intrusted to deter-

mine with some degree of certainty its quality by the appearance it presented to the eye, resistance to freezing, and its burning in small lamps; but this method, which was too imperfect to insure with certainty the reception in any case even of sperm oil of good quality, was entirely inadequate to the inspection of lard oil, and especially to serve as the basis of the rejection of a lot of the material which had been presented ostensibly in accordance with the terms of a contract.

Attention has therefore been given for many years to the subject of inspection of oil, and a series of investigations in regard to it have been made at different times by different persons in the employ of the Board. From all the experience thus obtained, and the researches of the committee on experiments, especially in regard to lard oil, a system has at length been elaborated which it is thought will reduce the process to scientific precision and afford no reasonable excuse in the future for the reception of oil of an inferior quality.

For researches in different illuminating material there has been fitted up, under the direction of the chairman of the committee on experiments, at the depot of the Light-house Board on Staten Island, a dark chamber, painted with lampblack mixed with sizing, and afterward sanded and painted again in order to avoid all reflection of light. In this room is placed a Bunsen's photometer, the scale of which is two hundred inches in length, and is graduated so as to give immediately the multiples or sub-multiples of the light that may be under examination as compared with a standard. Besides this, a number of articles of chemical apparatus have been procured for fitting up a small working laboratory in which researches in regard to the character of oils and other subjects pertaining to the light-house service may be carried on with facility. There has also been provided an apparatus by which a number of samples of oil can be subjected at the same time to an air bath of a low temperature, and kept at any required degree of the thermometer for several hours. With these appliances, the inspection of oil for light-house use is as follows:

1st. The oil is received at the light-house depot, the several casks numbered, and placed, previous to inspection, in a vault expressly prepared for their storage.

2d. Samples are taken hap-hazard from each lot and a number of Franklin lamps of the sixth order filled with them.

3d. After being properly trimmed and allowed to burn for an hour, each lamp in succession is photometrically tested, the standard employed being a London sperm candle, burning about two grains of its substance per minute.

4th. After having burnt for five or six hours longer, the lamps are again subjected to the photometrical test, in order to ascertain whether any change has taken place in the intensity of the light during the interval.

5th. After this they are suffered to burn as long as they will do so with undiminished brilliancy.

6th. The samples of the oils are next subjected to the freezing test in the air bath, which is kept at the temperature of from 38° to 40° Fahrenheit for four or five hours.

7th. If the flame of the sixth order Franklin lamp is found to be equal to that of eight sperm candles, the light continuing undiminished for twelve hours without trimming; and the oils stand the freezing test, these samples may be considered of a quality worthy to be accepted, other characteristics being noted.

8th. To test the oil contained in the several barrels of each lot, a sufficient number of cylindrical lamps, each about five inches in diameter, seven-eighths of an inch high, and having a short flat wick, are filled with samples, including those already tested by the photometric process, the lamps being properly numbered so as to correspond with the numbers of the casks.

9th. These lamps are placed in a large room, subject to the same conditions of temperature and air, and suffered to burn till they go out. If they all continue to burn with undiminished brilliancy for twelve hours, as compared with the samples already tested, the oil may be accepted.

10th. If, however, any of them decline in illuminating power, the oil from which they were filled is subjected to the photometric process, and if it does not stand the test, is rejected.

11th. Care must be taken to ascertain whether the illuminating power is not due to a mixture of kerosene. This may be ascertained by the odor, and also by heating a small quantity in a capsule by means of a spirit lamp, the bulb of a thermometer graduated for high temperatures being immersed in the liquid. Pure lard oil does not take fire from a lighted taper when heated to 500° Fahrenheit, whereas mixtures of kerosene readily ignite from a temperature of 100° Fahrenheit and upwards.

12th. The oil should be tested with slips of litmus paper suffered to remain immersed for an hour or so to ascertain whether there exists a free acid which would tend to corrode the lamps.

13th. The temperature of the oil is taken at the time of gauging, and the volume reduced to that of 60° by means of a table prepared for the purpose.

It is proper to state that the standard first adopted for the comparison of lard oil was from samples furnished by Messrs. Alden & Co., of Boston. For this has been substituted the London candle, because it is the standard to which the value of gas-light in England, as well as in this country, is usually referred.

The important and interesting subject of fog signals has had the earnest attention of the Board, and an elaborate series of experiments has been made in regard to it. The Board are, however, not at present prepared to give a full report of all that has been done in regard to this matter, since the experiments are still in progress. The problems connected with the subject are of much difficulty, involving as they do the principles of acoustics, the application of steam and heated air as motive powers, and the choice of bells, whistles, trumpets, and sirens in their special adaptation to different localities. It is confidently thought, however, that important advances have been made, and that when a few more facts have been definitely settled, the Board will be prepared to adopt a general system by which each locality will be provided with the instrument best suited to its surroundings.

FIRST DISTRICT.

First light-house district, extending from the northeastern boundary of the United States to Hampton harbor, New Hampshire. There are in this district 46 light-houses and light beacons, 39 beacons, 271 buoys, exclusive of spare buoys to supply losses, 1 light-house tender, (steam.)

The inspector reports the light-houses and stations within these limits in a very creditable condition.

The changes and material repairs made at the several stations are as follows:

At West Quoddy Head, outside of keeper's dwelling repainted.

At Little river, revolving machinery cleaned.

At Libby island, cement floor laid in the cellar of the dwelling, bell tower rebuilt, new machinery supplied, and boat-slip repaired.

At Moose Peak, besides minor supplies and repairs, a new iron rod and truck have been furnished for revolving machinery, new weights put in, machinery cleaned, lanterns and ventilators cleaned and put in order.

At Narraguagus, fifth-order burner fitted with new tubes.

At Petit Menan, plastering in keeper's dwelling repaired and outside of dwelling repainted, revolving machinery cleaned.

At Winter harbor, keeper's dwelling repaired and outside repainted, bell tower repaired, parapet wall on lantern strapped with iron, boat-house and slip repaired.

At Mount Desert, third-order lamp fitted with new valves, plungers, and screws, lamp machinery furnished with new pawl and spring, burner refitted with wickholder, rings, and pinions. Fog-bell machinery examined, cleaned, and put in order.

At Baker's island, outside of keeper's dwelling repaired, revolving machinery cleaned, and wickholders repaired.

At Bear island, kitchen roof resingled.

At Bass Harbor Head, outside of keeper's dwelling repainted.

At Edgemoggin, plastering of kitchen repaired, underpinning of dwelling repointed.

At Deer Island Thoroughfare, outside of keeper's dwelling repainted.

At Pumpkin island, new cistern built.

At Martinicus, new bell tower and machinery built, implements repaired, third-order burner repaired.

At White Head, keeper's dwelling repaired and wood-work repainted throughout.

At Owl's Head, keeper's dwelling repaired and repainted outside, underpinning and chimneys repointed. Materials for a wood-shed have been landed and the shed will be built as soon as the work is done at the outside stations.

At Brown's Head, brick cistern and wood-shed roof repaired.

At Negro island, keeper's dwelling repaired and the wood-work repainted.

At Grindel's Point, a rubble stone sea-wall 204 feet long, $4\frac{1}{2}$ feet high, and 3 feet thick, has been built.

At Dice's Head, outside of keeper's dwelling repainted.

At Fort Point, fourth-order burner fitted with new tubes.

At Franklin island, outside of keeper's dwelling repainted, revolving machinery cleaned, and three burners fitted with new tubes.

Pemaquid Point, outside of keeper's dwelling repainted.

Burnt island, keeper's dwelling repainted outside.

Pond island, outside of keeper's dwelling painted.

At Seguin, boat-slip rebolted and refastened, bell-hammers and pendulum repaired, new cowl put in, and two first-order burners refitted.

At Cape Elizabeth, plastering in west dwelling repaired and inside repainted. Fog-bell tower repaired and strengthened by putting in eight hackmatack knees, five new braces, and one new beam, and refastening the bell-hammers, revolving machinery and clock cleaned, lamp regulator repaired, new lamp smoke-pipe put into the western lantern.

At Portland Head, new trucks and studs made for bell machinery, lantern ventilators fitted with new knobs, new cowl put in, and second-order lamp fitted with valves, plungers, &c.

At Portland breakwater, new cowl for lantern.

At Wood island, revolving machinery cleaned, fourth-order burner fitted with new tubes.

At Goat island, walk rebuilt, new set fifth-order Franklin lamps placed in lens.

At Boon island, lamps refitted with new valves, plungers, &c., new lamp smoke-pipe provided.

At Whale's Back, outside of the tower repointed and roof of wood-shed repaired, revolving machinery cleaned.

At Portsmouth harbor, plastering of dwelling repaired, and dwelling painted throughout.

At Isle of Shoals, outside of tower repointed, doors and windows of dwelling, boat-house and boat-slip repaired, revolving machinery cleaned, wick-holders and rings repaired, lantern ventilators cleaned and put in working order, new lamp and smoke-pipe provided and red shades supplied.

At each of the foregoing stations, the lens covers having been worn out, new ones have been furnished.

The requirements of the district are :

At West Quoddy Head, the outside of tower to be painted.

At Saddleback ledge, the outside of the wooden addition to be repainted, new

cylinders and balls on spindles of Muscle Ridge channel, next to entrance of Penobscot bay.

At Manheigan island, outside of dwelling to be repainted.

At Hendrick's Head, outside of tower to be painted.

At Pond island, a boat-slip.

At Seguin the boat-slip requires new timbers, the bell tower repairs.

At Cape Elizabeth, the outside of both towers to be recolored.

At Portland Head, a new bell tower.

At Wood island, a boat-slip and house.

At Boon island, boat-house needs repairs, and the granite coping at the watch-room deck repainting.

Beacons.

The iron spindles on Ram Island ledge, in the Kennebec, and Lee's Rock, are broken off. It is proposed to attach small spars to the stumps. The iron socket for a wooden spindle on Winslow's Rock, after lasting for two years, has been broken off again. The upper band of the socket on Beef island, and the socket in Sharp's Rock, Saco river, are broken off. The copper cylinders and balls of Gander island, Otter Island ledges, and spindles in Muscle Ridge channel, are in bad condition, and must be renewed.

Buoyage.

The following buoys, carried away by heavy weather and by ice during the last winter, have been replaced: Spars on Hypocrite ledge, Pond Island reef, Trafton's Island ledge, Cow ledge, Long Island ledge, South ledge, lower end of Upper Middle Ground, Dyer's Island ledge, Nova's Rock, Driscoc's ledge, Moore Rock, Elliott's flats, Danceberry's ledge, Thom's Rock, Symms's Rock, Moulton's ledge, Prospect Harbor ledge, Jordan's Delight ledge, Petit Menan bar, Southeast Point, north point of Middle Ground, Half-tide Rock, Hussey's Rock, Sharp's Rock, New Harbor ledge, Heron Island ledge, Western ledge, Middle ledge, Green Island reef, Trefethern's island, Egg Rock, Turnip Island ledge, Old Man's ledge, and Upper Gangway ledge; first-class iron can on Broad Cove Rock; second-class iron nun on Bulwark ledge and Witch Rock; third class wooden nuns on Jameson's Point, Fort Point reef, Bantam ledge, and Morton's Rock; third-class can on Lower Gangway.

New buoys have been established in the last year to mark the following dangers, viz: Spars on Stone's Rock to mark York ledge, off York river; on Watt's ledge, off Richmond island, to mark the entrance into Portland harbor, Maine, via Cape Elizabeth; on Long island, off Hlsboro', to mark the approach of Castine harbor; on Cummin's ledge, Emm's Rock; Leighton ledge and Bay ledge, to mark the passage over the bar through Moose Peak Reach; on Sand ledge, Channel Rock, and Gangway Rock, to mark the Seguin passage to Moose Peak Reach, Maine; third-class nun on Morton's Rock, to mark the approach to Lubec Narrows, for vessels coming from the westward.

In setting these new buoys and replacing those which have been lost from stress of weather, or are changed according to the season, the following articles have been used: one first-class iron can buoy; two third-class wooden cans, three third-class wooden nuns; thirty-four spar buoys; one hundred and eleven fathoms of one-inch chain; eighteen fathoms of one and five-eighths inch chain; thirty-six stone sinkers; four iron sinkers; eighty shackles, pins, and keys.

The passage-way leading from the Kennebec to Sheepscot river has been examined, and instructions given to have the passage buoyed out, upon the opening of navigation next spring.

The steam-tender Iris has been constantly employed, during the year, in keeping the buoyage in an efficient condition, supplying lime, fuel, &c., to the

different lights, transporting men and materials for making repairs, excepting the time occupied in going to Wilmington, North Carolina, and towing the light-vessel Arctic thence to New Bedford, Massachusetts. The repairs required to fit this vessel for the trip to Wilmington, and subsequently for the ordinary service she is engaged in, have amounted to about three thousand dollars for the year, an unusually large sum, but not greater, according to current rates, than would alone have been incurred by having the light-vessel towed the distance named by a hired tug.

The hull of the *Iris* is perfectly sound and very strong; the engine in good condition, and works very smoothly. The boiler begins to show weakness in the lower part, which has been frequently patched; the upper part, however, is in better condition, and, it is thought, will last two years longer. A new crown-sheet will probably be necessary this autumn.

Fog signals.

Complaints have been made in this and other districts as to fog signals, and these are not without foundation. The subject, however, is one of much perplexity, involving, as it does, not only great mechanical difficulties, but also sectional prejudices, and personal interests as to the kind of instrument to be employed. At a number of the points in this district, fog signals are required of great power. Bells, which have been used in other districts, have not been found sufficient in this. At West Quoddy Head, in addition to a large bell, guns proved ineffectual. Last year a fog trumpet, operated by a heated air engine, was erected; but the sound from this was not found sufficiently powerful to be heard at the required distance during the heavy wind from the ocean, which, in this locality, frequently brings with it a dense fog.

A hot-air engine, with an enlarged air reservoir operating a locomotive whistle, has been put up at Thatcher's island, Cape Ann; but this engine, though sufficiently powerful to blow a smaller signal trumpet, is not sufficient to give full effect to the whistle; though the apparatus is more effective than the one which was previously in use at this place; a still more powerful fog signal is called for here as well as at other points, especially at Cape Elizabeth, the turning point in entering Portland harbor.

It is probable that, to supply the requisite motive power to produce more efficient signals, recourse must be had to the use of steam. The board have, however, hesitated to introduce this power, not only on account of the expense of fuel and attendance, but also on that of the danger of intrusting the management of an agent of so much explosive energy to ordinary light-house keepers.

It is hoped, however, that, with the improvements which have lately been made in steam boilers, the latter objection will be obviated, at least in a considerable degree.

The whole subject of fog signals has been referred to the Committee on Experiments, and during the last two years a series of investigations have been made in regard to it, which it is thought will be of much value in the selection and improvement of the apparatus. A full account of the results of these investigations will be given in the appendix to this report.

SECOND DISTRICT.

The second light-house district extends from Hampton harbor, New Hampshire, to Gooseberry Point, Massachusetts. There are in this district 63 light-houses and lighted beacons, 50 beacons, 7 light-vessels, 451 buoys, exclusive of spare buoys for use in supplying losses, 1 steam tender, 1 sailing tender.

The inspector of this district reports most of the lights in excellent condition.

Changes and repairs.

The range light, at Newburyport, was, in the month of May, moved 90 feet to a point on the range of the main light, and a new channel which had been formed by the shifting of the bar. Keeper's dwelling thoroughly repaired, floors, plastering, doors and windows, outside steps, plank walks and platform, also kitchen chimney, out-houses, fence, and interior wood-work of lower story repainted.

At Ipswich, in June, the range light was moved 550 feet, to a point on the range of the main light and a new channel formed by the shifting of the bar. In November last, the plank platform and walks to towers were repaired, gutters put on barn with leader to the cistern, zinc lining for base of bug-light lantern, and doors and windows repaired.

At Annisquam, a covered walk 109 feet long, from dwelling to tower, has been built, new shelves put in store room of dwelling, iron brackets under mantel, house built over well, new well curb and windlass supplied, shingling of porch roof repaired, a chimney which had been blown down rebuilt and furnished with an Emerson ventilator, white paint for inside of tower supplied.

At Straitsmouth, efficiency of the illuminating apparatus increased by enlarging draught holes of lantern dome ventilator, roof of dwelling resingled on one side, sills of porch and threshold of doors renewed, windows reputtied, window casings, chimney tops and weather boards packed with paint cement, roof of the addition resingled, storm house built over front door of dwelling, door steps, locks, haungs, &c., repaired.

Slight repairs of tower, storm house, and parapet doors, new sills and planking to tower walk for length of 315 feet, boat-slip of 100 feet length renewed, gudgeons and rollers reset, one end of boat-house silled and boarded.

At Cape Ann, store closet built in new dwelling, watch room call bells hung with heavier iron and cranks, house pump repaired, retaining wall built alongside of westerly walk, and path widened so as to allow passage of a cart with supplies for tower and fog signal, new floor of stone and brick laid in engine house, and coal shed built adjoining it.

At Eastern Point, chimney tops of keeper's dwelling relaid, brick hearth renewed, window glass reputtied and sashes painted, storm windows furnished for lower rooms, roof patched and eaves resingled, outside finish repainted, latches and knobs of drawers renewed, surbase put in kitchen, floors painted, new cistern pump set and shelf made, doors of covered walk repaired, scuttle made over cistern, and sheathing of watch room and door of lantern renewed and new pintles for door, defective joints of dwelling and tower walls pointed with cement mortar.

At Ten Pound island, amid sundry necessary but minor supplies and repairs, an Emerson ventilator has been adapted to the kitchen chimney, and the draught holes of the lantern dome ventilator have been enlarged, by which the ventilation has been improved and the efficiency of the illuminating apparatus increased.

At Marblehead, southerly wall of boat-house taken down, relaid and pointed and posts set to receive beams of upper floor; opposite wall, of wood, righted and doors repaired, outer end of protection pier relaid, log pump and plank platform set at yard well.

At Egg Rock, ceilings of two rooms of dwelling replastered, window sashes and frames and outside finish repainted, an Emerson ventilator set on each chimney, window blinds repaired and painted, new woodshed door hung, upper flight of steps between landing and house rebuilt, landing steps refastened with new bolts, hand-rail fitted on front steps, bank wall on westerly side of house rebuilt and pointed.

At Minot's Ledge, inshore station, the two dwellings, store-house, boat-house, and blacksmith's shop painted outside, wood-work of four rooms and two halls

of tenements inside, two rooms and the hall of each tenement whitened, chimney resting on girdles built in each porch of principal dwelling, so as to allow cooking stoves to be removed from dining rooms in summer; landing steps, planking of boat-house wharf, buoy wharf, and roof of one buoy shed renewed, roofs of other sheds patched.

Minot's Ledge, tower, the leak through cracks in stone lantern deck has been effectually stopped by covering the stone deck with a gun metal deck bedded in paint cement. The metal deck extends beyond the stone outside, and has a heavy flange which encircles and fits closely to the stone; a flange is also turned down all around the lens circle on the inside, binding together anew the entire stone deck. The deck is fitted with tongued and grooved joints in radial ribs, a slot in each joint clasping one of the main astragals of the lantern, the ribs resting in grooves cut in the stone deck. A new balustrade standing upon the metal deck, and new lower mullions have been supplied. The brace rods which extended from the head of each astragal to the top of the balustrade posts have been fitted with turn-buckles and lengthened to reach an eye near the base of each new post, and bronze gutters set under each tower window sill inside to catch leakage, which no swing window exposed to dash of sea can effectually exclude, and fitted with pipes and rubber tubes leading to buckets, which are set aside when not in use, parapet wall repointed with cement mortar, as well as the very few and insignificant defective spots which appeared on a careful examination of the tower wall. With the exception of these few small spots in the joints outside, where the cement has shelled off slightly or been abraded by floating ice or driftwood, every joint in the structure, inside and out, remains just as it was laid, without flaw or blemish. The first effects of instability would probably appear in the joints about the crown of the arch which supports the lens deck; here, as elsewhere, the joint is perfect. The new work is in entire keeping with the grandeur and beauty of the structure, having all the appearance of being a part of the original design, nor can it be readily discerned how the deck was put on at any other time than when the lantern was erected.

At Boston, keeper's dwelling, covered walk, fog bell tower, and brick lining of light-house repainted.

At the Narrows, the ice breaker built to protect this structure, and which was carried away last winter by the sea, has been thoroughly rebuilt of oak piles secured with girders ballasted with stone, planked all over, shod with iron, and painted with red lead; iron piles, tension bars, &c., of the light-house foundation scraped and repainted with red lead; superstructure painted inside and out.

At Long Point, timber and plank bulkhead protecting the site thoroughly repaired, defective rollers of the boat slip renewed, and plank walk alongside of it relaid.

At Mayo's Beach, useless brick oven in kitchen torn down and store closet made in its place; ash pit door set in brick firing of sitting room fireplace; drawers and lockers in china closet; board partition in chamber forming clothes-press; a chimney retopped; new front door casing and weather strip; bulkhead of timber filled and embanked with sand and planted with beach grass built in front of dwelling, effectually protecting the site from further encroachments of the sea, which had begun.

At Sandy Neck, defective plastering of dwelling renewed, chimney retopped, window blinds rehung and repaired, sashes and packing frames and weatherboards reputted and repointed with paint cement, wood-work painted outside, chimney tops, window blinds and stairs, floors of three rooms, halls, storm house, shelves and walls of pantry and lower rooms painted, plank platform around dwelling, and plank walk from dwelling to boat-house renewed, platform built adjoining boat-house, boat-house doors and windows repaired, well cleaned and platform repaired, pump pipe soldered and new pump set, timber and plank bulkhead surrounding site partially renewed and thoroughly repaired.

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At Brant Point, base boards of front room; hall and chamber of dwelling re-nailed, lathing and plastering on one side of each renewed, passage ways from house to tower plastered, chamber window-sill renewed, two rooms and hall papered, south and east walls of dwelling painted outside, sandstone coping of tower repointed and painted, tower and passage walls painted outside, as well as tower door and window casings, all broken glass renewed.

At Hyannis, attic rooms finished by furring, plastering, setting base boards, hanging doors and painting wood-work, scuttle window set in roof and tower window renewed, junction of tower and wharf leaded, sides of walk reshingled, storm house built over kitchen door, new window blinds hung, sink drain laid.

At Cape Poge, barn repaired with new sills and doors, roof reshingled and sides partially reboarded, new curb supplied for cistern, and boat-house built.

At Cuttyhunk, east end of dwelling repainted, plastering of kitchen repaired, junction of porch and dwelling packed with paint cement, roof of boat-house renailed and patched.

At Dumpling Rock, window and door frames packed with paint cement and painted, broken glass repaired and sashes reputtied and painted, tops of chimneys, gutters, window blinds, parapet wall and railing repainted, blind hinges renailed and door fastenings repaired, and all defective joints of house walls repointed with cement mortar, northerly boat slip and steps rebuilt and southerly ways repaired and refastened.

At Clark's Point, keeper's dwelling painted outside, sashes and scuttle windows reputtied and painted, blinds, under-pinning, chimney tops, outside steps, gate and storm house, and interior finish of parlor, entry and two sleeping rooms painted, shed roof reshingled, and new cistern pump supplied.

At Palmer's island, dwelling windows and door fastenings repaired, sashes reputtied, door steps renewed or repaired, cistern pipe boxed in board, weather strip on front door, tower window frames packed with cement, sashes reputtied and painted, defective joints of wall pointed with cement mortar.

At Bird island, in November, 1866, the island was swept by the sea, filling well and cellar, damaging sea wall and carrying away part of enclosure fence; these have been restored or replaced, thorough repairs of sea wall generally completed; wall on southwest side rebuilt, 120 feet long, 6 feet high, and 7 feet thick, and new wall built on the northwest side, 175 feet long by 4 feet high, and $3\frac{1}{2}$ feet thick, to arrest encroachment of sea on that side; new close board fence 115 feet long, 6 feet high, with sills of pine logs, has been built on the southwest side and securely braced; pier of logs in crib-work filled with stone and covered with plank, built from westerly landing place to boat-house, 67 feet long, 5 feet high, and $4\frac{1}{2}$ feet thick, to protect boat-slip; easterly pier repaired by putting in new cross-ties, partial refilling with stone and re-covering with plank; dwelling—new cellar staircase, five new floor timbers and cellar windows; entrance from outside made by cutting through wall and setting a door and cellar case with a flight of stone steps and proper hangings and fastenings; barn—new sills and one floor beam, one side reboarded, side and end reshingled and roof patched; house, 7' 8" by 9' 6", with six-foot posts, built over cistern; well deepened 3 feet and cemented anew.

At Ipswich, Annisquam, Eastern Point, Baker's Island, Race Point, Long Point, Mayo's Beach, Cape Cod Highlands, Nausett, Chatham, Monomoy Point, Brant Point, Cliff Beacons, Cape Poge, Edgartown, Holmes's Hole West Chop, Tarpaulin Cove and Ned's Point stations repairs are in progress; most of these are very slight, consisting mainly in the stoppage of leaks in dwellings, repairs of platforms, walks, &c. It is expected that all will be finished this season. At other stations in this district not named, less considerable but requisite repairs have been made and supplies furnished, which it is not thought necessary to enumerate.

The boat-house and boat-slip at Ten Pound island, the slight requirements at Boston light-house, Billingsgate and Bishop and Clerk's, and the more important repairs of Long Island Neck and Wing's light-houses, will be attended to before the close of the season. When that is done every station in this district, except Sankaty Head and Bass River, will have received all requisite repairs. Next season the dwelling at Sankaty Head will require reshingling, and the lantern of Bass River repainting. A boat-house at Dumpling Rock is recommended as more convenient and serviceable than the crane now in use.

Beacons erected and repaired.

At Abbott's Rock a new spar beacon, with the old day-marks affixed, has been erected.

At Rams-horn ledge beacon, capstone replaced and new mark affixed to the spar beacon already there.

At Lobster Rocks, (Beverly harbor,) stone-work beacon thoroughly repaired ; new mast, day mark, and vane supplied.

At Bowditch ledge several stones in the lower courses of the beacon have been knocked away, probably by drift ice. As no effectual repairs can be made without taking down the whole structure, (which may still stand for many years,) it is recommended that nothing be done at present.

At Hardy's Rock, the beacon (a wooden mast set in a hole in the rock) stands much out of plumb, but is not broken, and seems as securely fixed and affords as prominent a mark as if upright.

At Half-tide Rock beacon, (Swampscot harbor,) the granite block which held the mast is broken. New mast and day beacon will be set; a buoy, meanwhile, marks the danger.

At Halfway Rock, all but foundation of this beacon gone. A beacon seems hardly necessary upon so prominent a rock. Therefore, it is not proposed to repair it.

Light-vessels.

In the gale of December, 1866, the Vineyard Sound light-vessel dragged her moorings, drifted from her station, and was considerably damaged by the sea. The damages were repaired and the vessel promptly restored to her station. On the 28th of August (same year) she was fouled by a vessel loaded with lumber, and so much injured that she had to be hauled upon the railway for repairs. Returned to her station on the 10th of September.

The Pollock Rip light-vessel having been found in a very decayed condition, was taken to New Bedford, a contract made there on 2d February, 1867, for her repair, which was made accordingly, and the vessel restored to her station on the 4th of June.

The Cross Rip light-vessel parted her moorings in the gale of December 28, 1866, and, drifting to sea, was abandoned there on the 30th of the same month. The light-vessel of the Hen-and-Chickens reef was transferred to the Cross Rip station on the 11th of January ; and on the 4th of May the Arctic (which had been towed from Wilmington, North Carolina, by the steam tender Iris, to New Bedford and repaired) took her place. The Arctic, the Shovelful, the Hen-and-Chickens, and Handkerchief light-vessels all received more or less damage from the ice last winter, and were each taken to Hyannis in June last, where they were repaired.

The Nantucket Shoal light-vessel parted her moorings on the 3d of August, and was towed by a fishing schooner to Edgartown harbor ; thence she was taken to New Bedford for some slight repairs, and returned to her station on the 20th of August.

The Relief light-vessel, after constant service for more than a year, was taken

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to New Bedford August 22, decks repaired and calked, vessel refitted, new windlass and bitts supplied, and made ready to relieve any station in the district at an hour's notice.

The gales during the past year have been unusually numerous and severe, and some difficulty has been experienced in keeping the light-vessels in efficient condition, and restoring them to their stations when driven off; it is thought, however, that with the nine vessels now in perfect condition, and the Arctic, the decks of which need some slight repair, this important branch of the service will be sufficiently provided for.

Buoys.

An unusual number of buoys has been carried away or displaced by the severe storms of the past season, notwithstanding the care in inspecting the moorings and shifting them regularly at the proper season; but whenever buoys have been reported missing by mariners or others they have been restored at the earliest possible moment. Two new bell-buoys have been constructed by contract for the Grand ledge, considerably stronger than those previously placed there, one of which has been put down.

Buoy-tenders.

The boiler of the steam tender Cactus, employed in the southern part of this district, having become unfit for service and unworthy of further repairs, a new boiler was put in her, last July, and her engine and machinery put in perfect working condition. Some necessary repairs were also made on the hull of the vessel, which was painted throughout. The Cactus, consequently, is in better condition than she has ever been since she belonged to the light-house service.

The schooner Wave, employed in the northern part of the district, has had slight repairs during the year, and, as she has been in constant service for the last fifteen years, requires overhauling, with a view to the thorough repair she most probably needs after so much continued work.

Supplies.

Supplies liable to adulteration are in this district examined and officially reported on by the "State surveyor" as commercially pure. This precaution has been found a very necessary protection to the public interests.

The general supply vessels Pharos and Guthrie have supplied all light stations except those between Cape Henry and Cape Lookout; these are now being supplied by a vessel chartered for that purpose. The Pharos is under repairs at New Bedford.

The present buoy depot of this district having been found inadequate to the storage of the buoys, it was proposed that the property leased by the government at Wood's Hole should be purchased for the light-house establishment; and, to that end, the title papers are now in the hands of the Attorney General for examination.

THIRD DISTRICT.

The third light-house district embraces all lights and other aids to navigation, from Gooseberry Point, Massachusetts, to Squam inlet, New Jersey, including the Hudson river and Lake Champlain.

There are in this district 92 light-houses and lighted beacons; 44 beacons; 6 light-vessels; 335 buoys, exclusive of spare buoys for use in supplying losses; 1 steam tender; 1 sailing tender.

The light stations in this district are reported as generally in good condition.

The operations completed, on hand, and proposed, are as follows :

Beaver Tail, R. I.—The granite deck on the tower has been covered with a new cast-iron deck-plate; and the brick parapet, formerly lined on the outside with zinc, has been enclosed with cast-iron panelled plates, making the tower perfectly water-tight.

Lime Rock, R. I.—Two good coats of paint have been given to the wood-work of the keeper's dwelling, inside and out; the chimney raised, cellar floor laid with concrete, new landing-wharf built and boat-davits put up, cistern repaired; and shutters provided for keeper's dwelling.

Goat island, R. I.—The new brick dwelling has received two coats of cement wash and one of whitewash; part of the stone pier, on which the light-house stands, has been repointed, and the inside woodwork of the dwelling repainted.

Dutch island, R. I.—The tower has been covered with new cast-iron deck-plate, surrounded by wrought-iron railing; and new boat-house and boat-ways built.

Nayat Point, entrance to Providence river, R. I.—The light is to be discontinued and transferred to Connimicut beacon.

Point Judith, R. I.—A fog-signal, consisting of Daboll's trumpet, sounded by a Wilcox caloric engine, has been established, and a proper building for it erected.

Block island, R. I.—The reconstruction of the tower and keeper's dwelling on a more eligible site is well advanced, and will be completed this season.

Watch Hill, Conn.—The tower needs to be covered with an iron deck-plate; the dwelling repainted and repaired; cellar ventilated, and new door and stairs provided; outbuildings, such as barn, stable, and woodshed, to be renewed, being too dilapidated for repairs. The sea-wall requires some repairs, and the ground around the tower and keeper's dwelling needs grading, to keep the water from the cellar and foundations.

Morgan's Point, Conn.—The new building is so far advanced that it is expected to roof it in and finish the inside this season.

North Dumpling, Conn.—The buildings are very much decayed, the lantern worn out and of old pattern, the whole requiring to be re-established in a more efficient manner. A better fog-signal than the bell is wanted.

Little Gull island, Long Island, N. Y.—Preparations making to rebuild tower. Work will be vigorously prosecuted during the season. It is deemed necessary to rebuild the keeper's dwelling, which is no longer worth repairing.

Plum island, north of Gardiner's bay, N. Y.—The tower and dwelling of about the same character and date as those now under repair at Norwalk and Great Captain's island, and require considerable repairs. The tower is damp and contracted, and it is recommended to rebuild it and the dwelling, and provide a new lantern.

Cedar island, N. Y.—Preparations making to rebuild the light-house, and the work will be commenced this season.

Saybrook, Conn.—Keeper's dwelling requires repairing and repainting inside and out; woodshed to be connected with kitchen; old shed, connected with tower and entirely rotten, to be removed; iron stairway and iron window shutters to be substituted for the wooden ones, which are rotten; iron deck-plate to cover tower, and lantern to be repaired; storeroom to be built between tower and keeper's dwelling, and a more efficient fog signal to take the place of bell; sea-wall to be repaired, and grounds properly graded.

Brockway's Reach, Connecticut river.—The protecting pier of the iron beacon is rotten, falling to pieces, and in danger of being swept away by ice the coming winter. It is necessary, therefore, to rebuild the pier with heavy blocks of granite, laid with cement mortar.

Horton's Point, Conn.—Tower, built of wood, shows signs of decay; the lantern of old fashion, rests on a brick parapet, constantly out of repair and

leaky. The lighting apparatus consists of two range lenses, set in a revolving iron frame. The flashes shown by this apparatus are of too short duration, and the intervals between them too long for the purpose required. The keeper's dwelling, of wood, is yet in tolerable condition. It is expedient, however, to rebuild the tower, and it is recommended as the best economy to reconstruct the dwelling at the same time, both of more durable material. The fog-bell is of little or no use, and should be replaced by a more effective signal.

Faulkner's island, Conn.—Arrangements have been made to repair the walls of the well and boat-house, which are falling, before cold weather.

New Haven, Conn.—The keeper's dwelling out of repair, roof leaky, floor settling, and outbuildings require general renovation; the necessary steps for which have been taken.

Stratford Point, Conn.—The tower is of wood and shows signs of decay. The lantern, of an inferior model, rests on a brick parapet, and is constantly out of repair and leaky. The lighting apparatus, consisting of two range lenses in an iron frame, gives flashes too short in duration and at intervals too long. The tower should be rebuilt, and provided with suitable oil and store-rooms. The keeper's dwelling is in tolerable condition as yet, but rather small for a station with an assistant. It would therefore seem expedient to rebuild it at the same time as the tower. The fog-bell is of little or no use, and a more efficient one should take the place of it as soon as practicable.

Bridgeport beacon, Conn.—Lower part of structure, which had been corroded, repaired; fenders, bolts, &c., renewed. Damage to lantern by vessel running into it, repaired, and the whole beacon repainted.

Old Field Point, opposite Stratford Point light.—Preparations making to rebuild the light-house. Too late, however, to begin this season.

Black Rock, Conn.—Iron-work for tower nearly finished, bricks delivered, and work expected to be completed before the season closes.

Eaton's Neck, Long Island, N. Y.—A fog-signal is recommended, because this station is not only a very important one for the navigation of the sound, but also marks the entrance to Lloyd's Harbor, an important place of shelter, principally to sailing vessels. After a severe snow-storm, early last spring, three vessels were found wrecked at the mouth of this harbor, which disaster would probably have been avoided had the entrance been defined by a powerful fog-signal.

Lloyd's Harbor, Long Island, N. Y.—New lantern-deck and iron railing put up; inside of lantern lined with wood; shutters provided for all windows of keeper's dwelling; and store-room for oil and supplies; shed for fuel and small cellar under east room of dwelling, built.

Norwalk island, west entrance to Norwalk river, Conn.—Preparation making to rebuild the light-house as soon as practicable, and it is expected to begin the work before the close of the season.

Great Captain's island, Long Island sound, Conn.—Preparations are also making to reconstruct this light-house, but owing to the lateness of the season the work must be deferred.

Execution Rocks, Long island.—The protecting pier on which the keeper's dwelling is to be built, is nearly finished. The work on the house will be carried on as long as the weather will permit.

Sands's Point, Long island.—The sea-wall thoroughly repaired, and three jetties of heavy granite masonry built to protect it; reconstruction of keeper's dwelling and oil-room in connection with tower, begun; rebuilding of tower also in progress. New out-houses will be built in place of the dilapidated structures now standing.

North Brother and Hart islands.—An act ceding jurisdiction over the land required for sites of light-houses and keeper's dwellings at these places has been obtained, and negotiations opened for the purchase of North Brother;

but, as the price asked was excessive, the matter has been referred to the United States district attorney, that necessary steps may be taken for the appraisal of the property as authorized by an act of the State of New York, ceding jurisdiction. Nothing has as yet been accomplished in relation to the purchase of the land required for a light-house on Hart island.

Great West bay, Long Island sound.—Brick-work on tower repointed, and together with foundation of keeper's dwelling, covered with three coats of cement-wash; new brick piers built under the piazza; new floor, bedded on concrete, laid in oil-room; roofs, at junction with tower, made water-tight; protecting water-table put around base of dwelling; two closets for oil and supplies, shutters for all windows, new doors for keeper's dwelling, and two for oil-room, provided; iron stairway of tower, inside and out of keeper's dwelling, repainted; new foundation under barn and out-houses built; and well and cistern repaired. The stone deck of the tower leaks and the parapet wall is cracked horizontally in a line with the air-registers, caused, it is thought, by oscillation of the tower. It is proposed to cover the deck with an iron plate and encase the parapet with cast-iron plates, which will be fastened to the parapet and lantern-deck.

Fire island, Long Island sound.—The roof of keeper's dwelling has been repaired, and new doors and steps made for the cellar.

Highlands of Navesink, N. J.—Sink and pump furnished for kitchen of principal keeper; drains opened and cleansed; work-room supplied with more shelving; and other slight repairs made. The barn and stables require repairs.

Sandy Hook, N. J.—Extensive repairs and renovations have been made this year to the keeper's dwelling.

East beacon, Sandy Hook.—New frame building with light on keeper's dwelling has been erected near the northeast point of the Hook, in place of the old East beacon. A powerful fog-signal will be substituted for the bell now in use, as soon as the most effective fog-signal shall have been determined.

West beacon, Sandy Hook.—A new lantern with iron deck-plate has been made. The foundation of this beacon having been threatened with destruction by the sea, a short timber pier was built in front of it, with projecting jetties, which has protected it in that direction. But now the sea, acting at a short distance from the tower, threatens to get in rear of it, and it may be necessary eventually to move the beacon inward on the same range.

Conover beacon, N. J., main ship channel range light.—Cistern cleaned and plastered, and a protecting wall put round it. New wooden steps furnished to kitchen door, thresholds and weather-strips for outside doors, and plastering repaired.

Chapel Hill beacon, N. J.—Fence rebuilt, cistern repaired, and new pump-chain furnished; plastering repaired.

Point Comfort, N. J., Gedney channel range light.—Cistern, kitchen, roof and plastering of dwelling, repaired. At present the building at this station is entirely surrounded by water at high tides, to remedy which it will be necessary to raise it five feet from the ground, and fill in with sand covered with clay, to keep the sand from drifting. The roof of the house requires reshingling, and house to be replastered and painted.

Elm Tree station, N. J.—Fence enclosing light-house grounds entirely rebuilt.

New Dorp, Staten island.—Keeper's dwelling repaired and repainted; fence and cistern repaired, and a cellar, lined with brick, built.

Fort Tompkins, Staten island.—Slight repairs made to dwelling and out-houses, new coal-bin put up, and tower whitewashed. The tower and keeper's dwelling are much in need of thorough renovations and repairs, for which estimates have been made.

Bergen Point, Newark bay, N. J.—Cast-iron deck-plate laid under lantern, covering the stone deck of tower. Necessary repairs made to keeper's dwelling.

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Passaic, Newark bay, N. J.—Copper lantern-deck replaced by a deck of cast-iron; tower thus rendered water-tight. Slight repairs to keeper's dwelling and the protecting pier.

Esopus Meadows, Hudson river, N. Y.—In a ruinous condition. It is proposed to rebuild the light-house on the plan already adopted for the other stations on the Hudson.

Rondout, Hudson river, N. Y.—In progress, and will be finished, it is expected, before the closing of the season.

Coxsackie, Hudson river, N. Y.—Pile foundations finished, and part of stone-work of protecting pier laid. It is intended to complete the pier, carry the house up and roof it this season, and complete the inside early in the spring.

Stuyvesant, Hudson river, N. Y.—Driving of piles just begun; will be finished and part of stone pier laid before river closes.

Whitchall Narrows, Lake Champlain, N. Y.—The stake-lights were replaced last winter by structures of heavy timber, filled in with stone and covered outside with heavy planking; the corners most exposed to drifting ice are protected by iron plates. The work was found to have stood well the severe test of the breaking up of the ice last spring.

Crown Point, Lake Champlain, N. Y.—Tower repainted, two storm doors provided, and stone steps relaid. Keeper's dwelling replastered, roof at junction of tower repaired, new pump and cover for cistern furnished, and store-room for oil and supplies put up.

Split Rock, Lake Champlain, N. Y.—Tower rebuilt of rock-faced limestone; brick and iron store-room of the same materials, attached to tower, and passage-way built of wood, connecting both store-room and tower with keeper's dwelling. Keeper's dwelling thoroughly repaired and repainted, and new boat-house built.

Cumberland Head, Lake Champlain.—Reconstruction of tower and keeper's dwelling going on, with every prospect of completing the work this season.

Point au Roche, Lake Champlain.—The dwelling wants repainting, the roof to be made tight, and the cellar repaired.

Windmill Point, Lake Champlain.—Keeper's dwelling provided with three new storm doors and double windows; stone steps on all outside doors re-set, and fence repaired.

Plattsburg breakwater, Lake Champlain.—Owing to the damaged condition of the north end of the breakwater, the lighted beacon at the south end, only, could be erected. A steamer lens was exhibited on this beacon on the evening of August 1, 1867. The repair of the north end of the breakwater, under the supervision of the engineer department, will soon be finished. The frame of the beacon for the north end is ready for erection, and the lantern has been delivered. It is expected, therefore, that the beacon will be ready before the close of navigation on the lake.

Light-vessels.

The light-vessels in this district are in good order, with the exceptions noted further on.

Bartlett's reef.—The vessel at this station has been removed for repairs, and the relief vessel put in her place.

Cornfield Point.—The moorings lost during the heavy gale last autumn have been recovered, and the vessel removed to them.

Bay beacons, spindles, &c., Narragansett bay and tributaries.

South Point, Rose island, Newport harbor.—The iron spindle serving as a day-mark having been carried away by ice, a granite structure has been built in its place, and is surmounted by the former spindle.

Connimicut Point, Providence river.—A beacon of rock-faced granite, laid in cement, has been built in anticipation of the transfer of the light from Nayat Point to this station. Meanwhile, a temporary day-mark is erected on this structure.

Bullock's Point, Providence river, R. I.—A beacon of the same material has been built, with an iron day-mark placed on it.

East Lime Rock, Newport harbor, R. I.—The iron spindle carried away last winter by ice has been replaced by a granite structure, supporting an iron spindle of the same size and form as the one lost.

Muscle bed, Bristol Ferry, R. I.—The stone beacon has been repaired, re-pointed, and whitewashed.

Borden's flats, opposite to Fall River.—The beacon is in danger of tumbling down. It is therefore proposed to reconstruct it on the plan of the Providence river beacons.

Long Island sound and tributaries.

Success Rock.—At the last session of Congress an appropriation was made to build a beacon on Success Rock. The sum is insufficient for the purpose, the site requiring a substantial structure, as the ice at this point runs so strongly and in such masses that an ordinary spindle would be swept away annually. A further appropriation is accordingly necessary.

Brockway's Reach, Connecticut river.—The beacon was almost entirely turned over by running ice last spring. The protecting pier is rotten and falling to pieces, and it is to be feared that it will be swept away by the ice during the coming winter. It is proposed to reconstruct the beacon in a more substantial manner, and to rebuild the pier with heavy blocks of granite laid in cement mortar.

Southport harbor, Southport creek, Long Island sound.—Two beacons, destroyed by ice, have been substantially rebuilt with rock-faced granite laid in cement, and the outer beacon crowned with day-mark of cast and wrought iron.

Norwalk beacon, Norwalk river, Long Island sound.—The beacon, which had been swept away by ice, has been built in a more substantial manner of rock-faced granite, laid in cement, on the west end of *Long Beach island*, a better site, with a day-mark of cast and wrought iron. The title to the land has been conveyed by the town of Norwalk, and jurisdiction ceded by the State of Connecticut to the United States.

Elbow beacon, Newark bay, New Jersey.

The beacon has been rebuilt of rock-faced granite, in the most substantial manner.

Proposed beacons at Sabine's Point and Fuller's Rock, Providence river.

It is proposed to establish new beacons on the plan of *Bullock's Point* beacon, with proper day-marks to distinguish them from other beacons in the river. These beacons have been petitioned for by persons interested in the navigation of Providence river, and the subject examined by the light-house inspector and engineer of the district by order of the board, both concurring in the propriety and expediency of erecting these aids.

A lighted beacon is also recommended on *Whale's Back*, at the entrance of the Mystic river. This rock, now marked by a spindle, is directly opposite to the Morgan's Point light-house, and makes a sharp elbow at a narrow point of the channel. The proposed beacon is therefore very much needed for the better navigation of the river, particularly at night, when vessels in attempting to pass up or down frequently get on shore.

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At Great Reef, *Norwalk island*, a spindle, with a suitable day-mark, is required for the large rock just awash at high water, now insufficiently marked by a spar buoy. This rock has been the cause of many wrecks.

Buoy service.

The buoy service in the third district has been performed in a satisfactory manner in the waters of the coast and sound by the tenders Putnam and Sunbeam, by contract on Lake Champlain, and the employment of certain parties at the customary rates on the Hudson river, which requires to be re-buoyed every spring to mark the changes in the channel and make it safe for navigation. Buoys have been placed at the entrance to Connecticut river and in Rockaway inlet.

The buoy wharfs at New London and Newport, which were much out of repair, have been put in thorough order. At Newport the southeast corner of the wharf has been rebuilt with large blocks of granite, and the south side repaired and raised by means of a granite coping to a proper level, fender piles and fasts furnished, and the crane put in serviceable condition.

Buoy tenders.

Steam-tender Putnam.—This vessel, though not built for, and consequently not so well adapted for light-house service as desirable, has been, when not engaged in the primary duty of keeping the buoys of the district in place or under repairs, constantly employed in the transportation of material for the use of the engineer of the district in his work, of supplies shipped from the depot to the various light-vessels and stations, and in towing light and other sailing vessels, as the occasion of service frequently requires. Her machinery is reported to be good; her boiler, however, after frequent patching, is no longer safe with more than twenty pounds steam, and must be replaced by a new one. The sailing tender Sunbeam is in good order.

Light-house depot on Staten island.

Previous to the establishment of this depot the reserve material for the light-house service was stored in the several districts, involving the necessity for a multiplication of storage buildings, mechanics, workmen, supplies of all kinds, apparatus, &c., and it frequently happened that articles were purchased for use in one district when there was an excess of the same in other districts. To reduce to the minimum the supply of the service and the consequent expense, it was evident that there must be one storehouse, one workshop, one oil vault, &c., gathered together at one spot and called a depot, from which all needed supplies and apparatus could be issued as they might be wanted, upon requisitions from the inspectors or engineers of the several districts, approved at the office of the Light-house Board. For convenience of purchase and shipment, it was just as evident that this depot must be at or in the immediate vicinity of New York city.

After consideration of the subject, an estimate of the cost of a suitable lot of ground and the expense of constructing buildings was submitted, and an appropriation was made by Congress of the amount named, fifty thousand dollars. Among several lots offered to the board was a portion of the revenue grounds on Staten island, and since this was not only eligibly situated, but was already in the possession of the United States, and therefore required no outlay of public money for its purchase, but simply a transfer to another appropriation of the amount remaining after the completion of what was then deemed a sufficient building for storage, workshops, &c., this was decided upon, and about thirty-

three thousand dollars (\$33,000) was transferred to the appropriations of the revenue branch. A portion of this sum was afterwards expended under the revenue branch in building a sea-wall along the water front of the lot and grading the grounds. This sea-wall proving totally worthless, and the grading not having been sufficient, estimates were submitted for a new sea-wall and the completion of the grading, as well as for the construction of an oil vault, buoy shed, workshops, &c., and the requisite appropriations were made.

The depot thus established very soon proved its usefulness, even far beyond what had been anticipated, and its convenience and economy were fully equal to its usefulness. Although it was expected that the business of the depot would be large, it has far exceeded the expectations, and it was demonstrated that there was neither sufficient room nor facilities to insure the best practical results, or to answer all the demands made upon the depot; and under authority of an act of Congress appropriating the requisite amount therefor, a strip of land on the north side of the lot was purchased from the State of New York. This strip, only twenty-nine feet and one-half an inch in width, extending the full depth of the lot, did not add materially to the area of it, but secured a frontage upon a public street for the entire depth of the lot.

The establishment of a new quarantine station in the lower bay and the abandonment of that on Staten island obviated the necessity for a revenue station where it had been, except for the mere purpose of boarding vessels, and upon the application of the Light-house Board the honorable Secretary of the Treasury ordered the transfer of the remaining portion of the revenue grounds and buildings (except the boat-house) to the light-house establishment. When a contemplated addition of a strip of fifty feet in width, extending along the south side, now belonging to the State of New York, has been made, and for which no further appropriation is required, the grounds will have sufficient area for the purposes of the depot.

Since the transfer of the revenue station to the light-house establishment, the plan of the general arrangements of the depot has been modified to meet the present and prospective wants of the light-house service. The rebuilding of the sea-wall in front of that portion first acquired, to the street on the north, and the construction of the oil vault have been commenced and are in satisfactory progress.

Among the buildings acquired in the recent transfer are two storehouses, which are very old and far too weak for light-house storage purposes. It is proposed to take them down and to use the material in building a new storehouse, uniform with the one first constructed, for which purpose no new appropriation is required.

To avoid all danger from fire, which should not be permitted in the storehouses, it is proposed to put up a small building for offices for the district inspector, engineer, &c., for which purpose an estimate is submitted.

To render the harbor perfectly safe for the mooring during winter of the tenders and spare vessels of the establishment, very considerable improvements will be necessary, but it is not proposed to make them during the next season, therefore no appropriation is required at present.

Arrangements have been made at this depot for testing oils offered by contractors and for experimenting with lamps, apparatus, &c., used in the service. These arrangements are yet limited, but will be extended in accordance with the results obtained.

FOURTH DISTRICT

The fourth light-house district extends from Squam inlet, New Jersey, to Metompkin inlet, Virginia, including Delaware bay and its tributaries.

There are in this district 18 light-houses and lighted beacons; 2 beacons; 2 light-vessels; 75 buoys, exclusive of spare buoys to supply losses; 1 light-house tender, (sail.)

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Barnegat Light-station.—The work of building brushwood jetties for protecting the beach from washing, &c., along the light-house lot, was continued until the 13th of December last, when it became necessary to suspend operations on account of cold weather and running ice. The storms and ice destroyed most of the work constructed last season. Two of the jetties at the northeast point of the beach remained in good order, and caused the beach to make out sixty feet, besides raising it three feet higher than it had been before. This gave considerable protection to the base of the sand-hills along the light-house lot.

On the 1st of June last, operations were resumed upon the same plan, with some modifications. The effect has been to push the line of the beach thirty feet further out into the bay and raise the beach, at the northern point, five feet higher. This effect is very satisfactory, and it is believed still better results will be produced when the jetties are properly weighted with stone. A small quantity of rough stone placed along the beach midway between high and low water between the jetties, and the jetties themselves weighted, will probably prevent the sand from washing and give a more permanent protection. Arrangements have been made for getting about two hundred (200) tons of rough quarry stone deposited as stated above.

The plank platform between the keeper's dwelling and the tower has been renewed, and the sand fence around the building repaired. It was designed to give the tower two coats of cement wash during the warm weather, but owing to the almost constant rain during the month of August, it was thought best to postpone the work until next season.

Tucker's Beach.—Congress having made an appropriation of five thousand dollars for repairing and relighting this station, a party of workmen, with building materials, were on the 15th of April sent there. New floors were placed in the dwelling, and the building thoroughly repaired, a new brick water cistern built, new spouts and conductors, and a new pump supplied to the cistern. A new fourth-order lantern was placed upon the tower, the walls repointed inside and out, new window frames and sash, and a new granite sill to the door were provided. Both dwelling and tower received two coats of cement wash on the outside. A sand fence was constructed along the sea front of the light-house lot and the buildings enclosed by a cedar post and rail fence. A fourth-order lens, fixed varied by flashes, was placed in the lantern, and the light re-exhibited on the evening of June 20, 1867. The station is now in good order.

Absecon.—The measurements of the beach in the vicinity of the light-house have been continued semi-monthly throughout the year. The severe storm and high tides in March last washed the storm tide high-water line considerably. The ordinary high-water line has not undergone much change since the last annual report.

The main channel into the inlet has moved to the northward during the spring and summer. Should this action continue there is little doubt but the point of the beach will also move to the northward, a condition much to be desired. A few slight repairs will be made to the buildings before the close of the present season, and a coat of cement wash given to the tower early in next season, when the station will be in good order.

Cape May.—The fence enclosing the old two-acre lot, the small bridge over the ditch, and the roadway leading to the station, all of which were damaged by the storms in March last, are now being repaired, and next season it is proposed to give the tower a coat of cement wash.

Maurice river.—A few slight repairs have been made during the year. They included the cowl, water-conductor pipe, and the fence, new posts and boards being furnished for the latter. A new pump for the water cistern was supplied.

Brandywine shoal.—The plank platform around the buildings at this station will need repairs during the next year.

Egg island.—An appropriation of fifteen thousand dollars for a new light-

house at this station is now available, and it is proposed to prepare during the coming winter all the requisite material and in the spring construct a screw-pile light-house similar to the beacon-light at Cape Henlopen.

Cohansey.—The earth bank enclosing the building has, after settling sufficiently, been increased in height, and the new earth has been faced with stone. Some repairs are required to the oil-house and plank platform, which will be made before the close of the present season.

Fort Mifflin.—A new frame kitchen has been built; the pier upon which the building is founded and the fence around the pier have been repaired.

Christiana.—The new brick cistern has been finished; the brick oil-house repaired, the ditches cleaned out; a new out-house built, and the earth bank enclosing the station and the sluice have been repaired.

Reedy island.—Extensive repairs to the bank enclosing the buildings, rendered necessary by the storm and high tides in March, are now being made, and will be finished in a few days. A new brick water cistern has been built, the lantern and tower windows painted, the plank platform and the plastering repaired, and the windows and doors of the dwelling painted outside.

Bombay Hook.—Slight repairs are required to the plastering and will be made before the close of the season.

Mahon's river.—The plank platform around the building has been thoroughly repaired, and the lantern and building have been painted inside and outside.

Delaware breakwater.—Repairs are in progress, including a new floor for the fog-bell, machinery, the roof of the building, the plank pathway around the building, the footway from the boat landing, and the building painted throughout. The lantern at this station is old, and probably will not answer longer than a year. To provide a new lantern will require two thousand dollars, which sum is included in the accompanying estimates.

Cape Henlopen beacon.—The building is now being painted inside and out. The steps leading from the platform to the surface of the soil were last season carried away by storm tides. They have been renewed and arranged to hoist up. A few slight repairs will be made to the station.

Cape Henlopen.—The work of building the brick cylinder in the tower and putting in the iron stairway, iron window frames, brass sash, and iron door frame and door, was completed in November last.

Fenwick's island.—It is proposed to change the present manner of hanging the weight which drives the flashing machinery. This, with a few slight repairs, will be all that is necessary.

Assateague.—The work of constructing the first-order light-house at this station was continued until the 13th of December last, when it was suspended for the winter. The tower had reached an altitude of ninety-five (95) feet. The materials and other public property were properly stored and left in charge of a reliable man. On the 1st of March the work was resumed and prosecuted up to the present time. The tower has been completed and the stairway and lantern put up. The oil-house and keeper's dwelling were ready for occupancy by the 25th of September. The illuminating apparatus was adjusted and the first-order light shown from this important station for the first time on the evening of October 1st, and the entire work will be completed, the workmen discharged, and tools removed before the close of this month.

Light-vessels.

The Five Fathom Bank light-vessel was driven by stress of weather from her station, on the 21st of February, and reached the Delaware breakwater, where she was supplied with new moorings, and was replaced on the 13th of March. This vessel, on the 22d of March, during a very heavy gale, again broke adrift, and after severe hardship reached Hampton Roads on the 27th of

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that month. Needful repairs were made, and she resumed her station on the 28th of April.

The other light-vessel of this district, the Cross Ledge, has remained constantly on her station, except during the winter months, when she is withdrawn to avoid danger from ice.

Buoys.

The buoys at Absecum inlet were all carried away at different times during the last winter, and were replaced as promptly as practicable. During the heavy gale of March, 1867, the bar of this inlet was entirely changed, which necessitated its being sounded out and rebuoyed.

The buoys marking the channels into Great Egg harbor were also carried away by ice during the winter, and replaced as soon as possible.

The channel into Little Egg harbor, New inlet, has been sounded out and buoyed.

The general buoy service of the district has received careful and prompt attention, and is now in an efficient condition. The light-house and buoy tender of this district is found to be nearly unserviceable, by reason of age and arduous duty; it will be necessary to make adequate provision for supplying her place.

FIFTH DISTRICT.

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

There are in this district 62 light-houses and lighted beacons, 85 beacons, 4 light-vessels, 460 buoys, exclusive of spare buoys for use in supplying losses, 2 steam tenders.

Before the war, the aids to navigation in this district included a great number of light-vessels, many of which were in waters not subject to heavy seas, and but rarely to ice of such mass and strength as to make it dangerous to permanent structures. The rebellion had swept away all the light-vessels in the sounds of North Carolina, and some of those in the lower Chesapeake. In re-establishing these stations the opportunity was presented to carry into effect an object long had in view by the Board, viz., to replace the light-vessels, wherever practicable, by permanent structures, because of their greater economy, both in construction and maintenance. Generally the stations occupied by light-vessels are of such a character that the screw-pile light-house is the most eligible form of construction for any permanent substitute. This is particularly the case in the district in question, owing to the slight elevation of the adjacent shores and their swampy formation, the shallow water and the nature of the bottom. Since the last annual report screw-pile light-houses have been erected upon the eight following stations, formerly occupied by light-vessels, viz: Roanoke river, Harbor island, Southwest Point Royal shoal and Long shoal, in North Carolina, Upper Cedar Point, Hooper's straits, and Janes' island, in Maryland, and Lower Cedar Point, in Virginia, at a total cost of one hundred and twenty-one thousand and one dollars, (\$121,001,) which, under the authority of the second section of the "act making appropriations for light-houses, light-boats, buoys, &c., and providing for the erection and establishment of the same, and for other purposes," approved March 3d, 1859, has been charged to the appropriation for "seamen's wages, repairs, &c., of light-vessels." Thus far, no light-vessel removed or destroyed by the rebels has been replaced by a new one built for the purpose.

The experience gained in making the constructions referred to renders it probable that it will be practicable to substitute permanent structures at each of the light-vessel stations in the district.

The following is a statement of the present condition and requirements of the district. Repairs of a general character have been made at the following named light stations, viz : Cape Charles, Old Point Comfort, White shoals, Point of Shoals, Jordan's Point, Cherrystone, Back river, New Point Comfort, Stingray Point, Cove Point, Seven Foot Knoll, Lazaretto Point, and they are now in good condition.

Cape Henry.—A new iron stairway has been placed in the tower, and the station has been generally repaired. It is now in good condition.

Watt's island, Fog Point and Clay island.—New lanterns have been substituted for the old and worn-out ones, and the stations have been generally and thoroughly repaired.

Sharp's island.—The screw-pile light-house in course of erection, at the date of the last annual report, has been completed. It was severely tried during the last winter when the ice was of unusual weight and strength, but without receiving any damage that can be discovered.

Pool's island, Turkey Point, Fishing Battery, and Havre de Grace.—New and improved lanterns have been substituted for the old and worn-out ones at these stations, and they have been put in thorough repair.

The work on the beacons to mark the Brewerton channel, Patapsco river, is progressing. The iron-work of the foundation of the southeast and most important structure is completed, and the superstructure is in a forward state. The land upon which it is proposed to build the northwest beacon has not yet been obtained; neither has the legislature of Maryland yet passed the necessary act ceding jurisdiction.

The beacon-light at Somers's cove, in the Annapessex river, Maryland, provided for by act of Congress, is completed. It is a screw-pile structure of the least expensive class.

The light-house at Deep-water shoals, in James river, Virginia, was destroyed by ice on the 20th of January last. Its destruction was made the subject of a special report to Congress. An estimate of the cost of a more substantial structure was submitted, and the necessary appropriation was made available on the 1st July, coupled with the condition that the work should be done by contract. Its construction is now in progress, to be finished by the 1st January, 1868.

Cape Lookout.—The first order lens in use at this station before the war was much injured by the rebels. It has been repaired and restored to its place, replacing the third order lens temporarily in use.

The light-houses at Wade's Point and Croatan, the superstructures of which were burnt by our own troops, and that at Pamlico Point, which had been extinguished by the rebels, have been restored and are now lighted.

Bodies island.—This light-house was totally destroyed by the rebels during the war, and the Board does not recommend its re-establishment. But instead, it is recommended to build between Cape Hatteras and Cape Henry; a distance of one hundred and twenty miles of dangerous coast, now unmarked by any light; three light-houses of the fourth order, and an estimate of the cost is submitted.

Bogue banks.—This station, destroyed by the rebels, and not yet re-established, formerly consisted of a small brick tower, showing a fourth order light, and, together with a beacon of the sixth order, formed a range to enter the harbor of Beaufort, North Carolina. An estimate of the cost of its re-establishment is submitted.

In this district all the light-houses now in operation are in good condition, and amply supplied with necessary materials for a proper maintenance of the lights.

In only two instances during the past year have complaints of neglect of duty

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upon the part of the keepers reached this office, and, after careful inquiry, satisfactory explanations were given.

Franklin lamps have been substituted for the Fountain lamps heretofore in use at Cherrystone, Piney Point, Sharp's island, Fog Point, Watts island, Craney island, Clay island, and Stingray Point. New boats have been supplied to Blackstone's island, New Point Comfort, White Shoals, Point of Shoals, and Deep Water Shoals, light-stations.

Excavation of iron ore at Lazaretto Point.

Since the last annual report 494 tons of iron ore have been excavated at Lazaretto Point, for which the sum of seven hundred and seventy dollars and seventy cents (\$770 70) has been received.

The quantity excavated is 527 tons less than in 1866. The small amount produced is no indication of the exhaustion of the ore bed, but is attributable to the heavy rains which have fallen during the year; much of the contractor's time being employed in removing the water from the excavations to get at the ore. In addition to removing the water, the workmen have been engaged in other parts of the grounds, clearing the top earth, and levelling all irregularities in accordance with the articles of agreement.

Light-vessels.

Willoughby Spit.—This vessel being of iron, the constant scaling, particularly at the water line, has greatly impaired her strength, and it has only been by repeated patchings of the plating for the past two years that she has been enabled to remain at her station for so long a time.

On the 17th August last she was withdrawn, taken to Norfolk, and the vessel formerly marking *Upper Cedar Point* substituted.

York Spit.—The vessel formerly stationed to mark this danger was removed and destroyed by the rebels in the spring of 1861. Upon the completion of the screw-pile light-house at Lower Cedar Point, the light-vessel thus relieved was taken to York Spit and established upon that station.

Wolf Trap.—No repairs to the wood-work of this vessel have been needed during the past year. The floating ice of last winter tore off portions of her yellow metal sheathing, extending from her stern to the main chains on each side. This was repaired, and a new fog bell supplied in the place of the old one, which had become broken from long use.

Windmill Point.—The light-vessel which formerly marked this station was, in 1861, removed by the rebels and destroyed. The station has not yet been re-established, though the Board has under consideration the propriety of erecting a screw-pile light-house to mark the danger.

Janes' island.—On the 18th December, 1866, this vessel was reported to be leaking badly. Accordingly the Relief was sent to take her place, and she was taken to Baltimore, where she was thoroughly examined. The estimate of the cost of the necessary repairs, (more than eight thousand dollars,) was deemed more than she would be worth after their completion; particularly in view of the early construction of a screw-pile light-house to mark the station. She was therefore stripped of all public property and sold at auction, realizing the net sum of five hundred and eighteen dollars and fifty-five cents, (\$518 55.) Her lantern and accessories were sent to the light-house depot on Staten island, and the remainder of her outfit stored at Lazaretto Point.

The light from the new screw-pile light-house, substituted at this station, was exhibited on the night of the 7th October, 1867, at which time the Relief was withdrawn.

Smith's Point.—On the 19th January, 1867, the heavy bodies of ice from

the Potomac river and the upper Chesapeake came down the bay with such force as to endanger this vessel. Her moorings were slipped, and she was carried at will for two days by the ice and current, when the revenue cutter *North-erner* fell in with her and towed her into the Great Wyeomico, on the western side of the bay. She remained there until the 23d February, when she was taken in tow by the tender *Heliotrope* and replaced upon her station, with new moorings, after which the old moorings were recovered. The vessel sustained no damage, except to her yellow-metal sheathing, which was more or less injured throughout her whole length, at and below the water line. Without removing her from her station, this damage, so far as possible, has been repaired. A new screw-pile light-house, to be substituted for this vessel, is now under construction, and will be completed during the next season.

Hooper's Straits.—A new screw-pile light-house, to take the place of this vessel, was completed and the light exhibited for the first time on the night of September 14, 1867. She was then taken to and remains at Norfolk. After some slight repairs have been made to her she will be available for any station for which she is fitted.

Lower Cedar Point.—On the 6th August, 1867, a light was exhibited from the screw-pile light-house substituted for this vessel, and she was taken to Norfolk, put upon the railway, and carefully examined. It was found that after a thorough caulking of her sides she would be in good condition. This was done, and after being repainted yellow, and otherwise prepared for service, she was, in October, 1867, placed upon the York Spit station, which had been unoccupied since the beginning of the war.

Upper Cedar Point.—Upon the completion of the new screw-pile light-house intended as a substitute for this vessel, it was lighted for the first time on the night of July 20, 1867, and the vessel taken to Norfolk, put on the ways, her sheathing thoroughly repaired, and painted red. On the 17th August she was taken in tow by the tender *Heliotrope* and placed upon the Willoughby Spit station, the iron vessel formerly occupying it being no longer fit for service. The vessel now marking Willoughby Spit is in excellent condition in every particular.

Bowler's Rock.—The vessel formerly occupying this station having been destroyed by the rebels, examinations have been made with a view to the erection of a screw-pile structure to mark it in future. Other matters of more importance having demanded immediate attention, this is still held under consideration.

Royal shoal.—This vessel was destroyed by the rebels at the beginning of the war. The site formerly occupied by it being suitable for that of a screw-pile light-house, the station was re-established by the erection of one, from which a light was exhibited for the first time on the night of the 30th April, 1867.

Harbor island.—This station was re-established by the erection of a screw-pile light-house, from which a light was exhibited for the first time on the night of April 1, 1867. The vessel formerly occupying it was destroyed by the rebels at the beginning of the war.

Long shoal.—A new screw-pile light-house having been completed at this station, a light was exhibited from it for the first time on the night of May 31, 1867. The vessel previously occupying it, being no longer worth repairing, was taken to Newbern, North Carolina, stripped of everything which could again be of service in the light-house establishment, including lantern and accessories, chains, anchors, &c., and on the 9th July, after due notice, sold at public auction for the sum of three hundred and eighty dollars, (\$380.) The lantern and accessories were sent to the light-house depot on Staten island, and the remainder of her outfit retained in the district.

Roanoke river.—This light-vessel, like so many others, fell into the hands

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of the rebels at the beginning of the war, and the station was re-established by the erection of a screw-pile light-house, from which a light was exhibited for the first time on the night of January 1, 1867.

Relief.—Early in October, 1866, while this vessel was lying at her wharf in Baltimore, she was run into by the United States steamer *Phlox*, and her bends on the port side injured, causing her to leak. She was taken upon the ways and thoroughly repaired. Upon the withdrawal of the *Janes' Island* light-vessel from her station for repairs, the *Relief* was substituted, whence she was driven on the 15th January, 1867, by the floating ice. Her keeper returned her to the station on the 16th, and exhibited a light on that night. On the 17th she was again carried away by the ice, and the keeper, seeing that he could not regain the station, buoyed and slipped the moorings which the vessel had been dragging, and on the 18th succeeded in getting into the *Annamessex* river, where protection was found.

On the 12th February, the ice having in a great measure disappeared, the keeper renewed the moorings which had been slipped, and returned the vessel to her station. The screw-pile light-house, intended as a substitute for a light-vessel at this station, was completed and a light exhibited for the first time on the night of the 7th October, 1867, whereupon the *Relief* was taken to Norfolk, where she is now held for any service that may be required of her.

Buoy service.

The buoyage in Chesapeake bay, York, Potomac, and Patapsco rivers, and also in Hampton Roads, James and Elizabeth rivers, is in a satisfactory condition, and it is hoped that in the remaining tributaries of the bay it will be placed in a like condition at an early day.

Eastern coast of Virginia.

After considerable difficulty and lapse of time in endeavoring to have the work done at reasonable cost, the buoys in Hog Island inlet were placed in position on the 10th June, 1867. On the 28th July, 1867, buoys were placed in the proper positions in Wachapreague, Metomkin, and Sand Shoals inlets, and a contract has been entered into for their maintenance, as well as for those in Hog Island inlet.

Potomac river.—All buoys broken adrift or out of position have been put in their proper places, damaged buoys have been replaced by good ones, and a can buoy substituted for a spar at Matthias Point. An additional buoy has been placed at the mouth of the *Yeocomico*.

Tangier sound.—Additional buoys have been placed in this sound and in *Annamessex* river.

Hatteras inlet.—Nine buoys at this inlet, which had drifted from their position in the early part of the present year, have been replaced.

Beaufort and Core sounds.—During the year several of the buoys in these waters have gone adrift. They have been recovered and placed in their proper positions. The buoyage here is very defective, and requires the services of a tender to put it in good condition. The *Heliotrope* last visited the waters of North Carolina in August, 1866, giving attention to the inlets, to Albemarle, Pamlico, and Core sounds, but since that time it has not been possible to send the vessel there, except to the neglect of even more important duties.

On the 20th May last, fifty-four (54) iron buoys were furnished for service in this district, and a contract for seventy-five (75) juniper spar buoys has been made, twenty-four (24) of which have been delivered. The requisite quantity of chain has been purchased, and the district is well supplied at present with spare buoys and accessories.

Buoy-tender Heliotrope.

During the year this vessel has been employed in the usual work of replacing buoys and carrying supplies to the light stations belonging to the district. For nearly three months she was at the Washington navy yard undergoing repairs, during which time a sailing vessel was chartered to attend to a portion of her duties. Defects in her steam chimney, which had been overlooked at the navy yard, and a leak in her bottom, which had afterwards developed itself, have been repaired.

The steam tender J. N. Seymour has been exclusively used, during the past year, in connection with the construction of the screw-pile light-houses in this district, above reported.

SIXTH DISTRICT.

The sixth light-house district extends from New River inlet, North Carolina, to Cape Canaveral light-house, Florida, inclusive.

There are in this district 49 light-houses and light beacons; 123 beacons; 5 light vessels; 146 buoys, exclusive of spare buoys for use in supplying losses; 2 sailing tenders.

The service in this district has been as well performed as the means at the disposal of the board would permit. The damage done the aids to navigation during the rebellion was general, and although every exertion has been made to restore the system, it is not yet complete. The lights which remain to be established are, however, the least important.

The following is a statement of the present condition of the several light stations, together with the requirements of the district during the next year:

Federal Point; Oak island.—The buildings at these stations were erected in 1866, and are in good condition.

Price's Creek range lights.—These have not been re-established, as the range is no longer a good one. It is proposed to mark the range of the present channel by new towers, repairing and using the old dwelling. An estimate of the probable cost of doing so is submitted.

Horseshoe Shoal light-vessels.—In accordance with the policy decided upon by the board to replace wherever possible the authorized light-vessels by light-houses, the necessary examinations of the site at this station have been made, and a screw-pile structure, as the most suitable, is now in hand, and will be completed during the next year.

Orton's Point.—Has not been re-established. The station requires a new lantern, new sash and doors, plastering repaired, and breakwater in front to protect the site. The necessary estimate is submitted.

Campbell's island.—The buildings at this station were entirely destroyed during the war, and it is recommended that instead of rebuilding them a screw-pile light-house be placed on the shoal at the turn in the channel of the river, just above Campbell's island. An estimate is submitted for this purpose.

Upper jetty range.—This station, like the former, was entirely destroyed during the war. An estimate for its re-establishment is submitted.

Georgetown.—The tower at this station has been thoroughly renovated, new lantern placed on it, and the light re-established with a new fourth-order apparatus.

A good, substantial two-story and attic frame dwelling has been built, being in plan 24 by 26 feet, with a kitchen 10 by 10 feet, and a porch extending along the entire front. A cistern has been built, and a boat-house on the beach.

Cape Romain.—The tower is in good condition. The keeper's dwelling leaks in driving rains. The assistant keeper's dwelling is also reported as leaking. It is proposed to remedy all the defects by putting a new roof on the

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assistant keeper's dwelling, cement-washing both dwellings, and building a boat-house.

Bull's bay.—Has not been re-established, as there are other works which are considered of much more importance, and which have therefore been given precedence.

Morris island.—Works entirely destroyed during the war. An appropriation was made by Congress to establish range lights on Morris island to guide vessels in passing over Charleston bar. It is considered doubtful whether any useful range lights can be placed upon Morris island, and it is recommended that the terms of the appropriation be so amended as to permit the range to be placed wherever it would best subserve the end desired.

Fort Sumter, Castle Pinckney, and Battery Beacon stations are in good condition.

Sullivan's island.—This station consists of a temporary frame skeleton tower erected upon the roof of a private house. The house is in a dilapidated condition. It is recommended that range lights be built to indicate the channel, and thus render unnecessary the present light and the temporary light-vessel Weehawken. The requisite estimate is submitted.

Hunting island.—The buildings at this station were destroyed by the war. As the lines of steamers between Charleston and Savannah use the inland passage from St. Helena entrance it is proposed to restore the station, and an estimate of the cost thereof is submitted.

Combahee bank.—It has been decided not to restore the light-vessel formerly at this station, but in lieu thereof to substitute a screw-pile light-house. This will be done at an early day.

Hilton Head.—Range lights are in fair condition, needing unimportant repairs, which will be made.

Bay Point.—The temporary works (on old rebel barracks) were blown down in 1866, and a good skeleton frame of wood was erected. The illuminating apparatus is only a steamer's lens, yet it seems to be all that is required. Unless some greater necessity appears in the future, the appropriation of fifty thousand dollars for a new light at this point will not be expended.

Calibogue sound.—Before the war this station was marked by a light-vessel. It is proposed to substitute therefor a light-house, to be built on Braddock's Point. The proposed site is in possession of the government, and the necessary structures will be erected.

Tybee.—This was formerly a second-class station, but after a careful discussion of the requirements of commerce it was decided, in re-establishing it, to make it a light of the first order, having its focal plane one hundred and fifty feet above the level of the sea. When the rebels extinguished the light they attempted to destroy the old tower by fire, but without complete success, and it was found that a considerable part of it could be used. It was consequently torn down to the proper point, and the new masonry carried up from there to the requisite height. A new first-order apparatus and lantern were placed upon the tower, and the light exhibited therefrom on the night of October 1, 1867. The old tower was finished in wood. The new one consists of masonry and metal only, and is completely fire-proof. New dwellings for the keepers have been built and the station is now in good condition.

Tybee beacon, destroyed during the war, has been re-established by building a skeleton frame of fifty feet in height from base to focal plane, and designed to range with the main light in crossing the bar at the entrance to Savannah river, and placing upon it a new lens and lantern of the fourth order. The light was exhibited on the night of October 1, 1867.

Tybee Island knoll.—This was formerly marked by a light vessel, but it is proposed in re-establishing the station to substitute a light-house. This has not yet been done for want of time.

Cockspur, Fig island, and the Bay are in good condition, and will require only slight repairs of a current nature.

Oyster Beds.—In good condition. The dwelling for the keepers of Oyster Beds and Cockspur beacons is on Cockspur island near Fort Pulaski. It has had slight repairs, but needs a new roof, plastering repaired, and grounds enclosed, which will be attended to at once. A day beacon will be erected to mark the Oyster Rocks.

Sapelo.—The tower and other buildings, much injured by the rebels, need extensive repairs. The re-establishment of the station has been begun, and will be pushed forward to completion at an early day. A movable beacon will also be completed at the same time.

Wolf Island beacons, destroyed during the war, will soon be re-established upon an improved design. One of the beacons will be movable.

St. Simon's.—All the buildings at this station were completely destroyed by the rebels. It will be re-established upon new and improved plans as authorized by Congress.

Little Cumberland island.—The extensive repairs at this station necessary to restore it after its damage by the rebels have been made, and it is now in good condition. The light from a new lens and lantern of the third order was exhibited on the night of September 1, 1867.

Amelia island.—Repairs have been made to the tower, new glass placed in the lantern, weight of the rotary machinery cased, and an iron gallery placed around the lantern in place of the temporary wooden one. It is intended to complete the work at an early day, including a fence to enclose the grounds.

Amelia Island beacon, in front, seaward, of the main light, at a distance of about five-eighths of a mile, has been re-established. It is movable, on wheels and a tramway of one hundred feet. The range indicates the channel across the bar, entrance to Fernandina, Florida. A plank walk from the main light across the marsh to the beacon, three-eighths of a mile in length, is under construction and will soon be finished.

St. John's river.—Having been much damaged by the rebels, extensive repairs were necessary to restore it. These have been made; a new lens and lantern of the third order placed in position, and the light re-established on the night of July 4, 1867.

Dames' Point.—Before the war a light-vessel was stationed here, but the Board deems this an expensive way of marking the danger, and it is proposed to place a beacon light on shore, which will answer every purpose. But this being a comparatively unimportant station, will be among the last re-established.

St. Augustine.—Like many others, extensive repairs were required at this station to place it in the condition it was in before the war. These have been completed, a new lens and lantern provided, and the light re-established on the night of June 1, 1867.

Cape Canaveral.—Early in the year a working party provided with the necessary apparatus and materials was sent from New York city, and having landed at Cape Canaveral, made such repairs of a temporary nature as were necessary to permit the re-exhibition of the light from the old tower on the night of the 1st of June.

The same party has been engaged in preparing the foundation, and erecting the new cast-iron light-house contracted for before the war, but not finished until after its close. Four cargoes of material, including all the cast-iron work, have been safely landed, and the fifth cargo is on the way. The success which has thus far attended the undertaking warrants the belief that the work will be completed during the course of the next summer.

The appropriation for this work, having been made before the war, and the subsequent great advance in the price of materials and labor, has proved insuffi-

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cient to complete it, and an estimate of the additional amount necessary is herewith submitted.

Light-vessels.

Frying-pan Shoals.—Parted her moorings during a gale, in September 28, 1866, and was found October 10, 1866, about ten miles below Tybee, Georgia; was taken into Savannah, Georgia, afterwards to Charleston, where she was docked, repaired, and had her bottom cleaned. After being refitted with new moorings, she was, on November 15, taken in tow by the revenue cutter Ashuelot and placed on her station. Her moorings were sighted by the keeper on the 3d of September, 1867, and reported in good condition. It is thought that during the coming year she will require nothing more than the ordinary current repairs.

Charleston bar.—On the 20th of June, 1867, this vessel was temporarily removed from her station for repairs; was brought into Charleston harbor, docked, and after having all the necessary repairs made was returned to her station on August 9, 1867. Only the ordinary repairs are anticipated during the next year.

Weehawken.—This vessel (formerly a propeller) has recently been taken temporarily from her station for the purpose of putting a new plug in the cylinder through which her shaft worked. As soon as this work is completed she will be replaced on her station.

As this is an iron vessel, and has been a long time in service, it is probable that she is much worn and rusted. A correct report of her condition cannot be made until she is docked and thoroughly examined.

Martin's Industry.—This vessel having been reported in a leaky condition, was, on the 28th of March, 1867, temporarily withdrawn from her station and towed into Charleston harbor, where she was docked, repaired, and supplied with new moorings. On the 13th of May she was returned to her station; on the 15th of the same month she was reported leaking worse than before, and on the 27th she was again docked. The leak was caused by the worms getting into her through her strainer. It was stopped, and on the 9th of July she was replaced on her station.

Relief vessel.—While temporarily occupying Fishing Rip station, parted her moorings in moderate weather on November 3, 1866, the pin having worked out of a shackle; lost her anchor (a mushroom of 5,200 pounds) and thirty fathoms of chain. She was supplied with new moorings and replaced upon her station August 6, 1867.

Fishing Rip.—This vessel was brought into Charleston harbor last year for repairs, was docked and placed in complete order, ready for service. She is now temporarily occupying the station of the Weehawken light-vessel.

Arctic—This vessel, to which allusion was made in the last annual report, was built for a light-vessel at the Philadelphia navy yard, but before being used as such, was temporarily transferred for the use of the expedition to the Polar regions under command of Dr. E. K. Kane. She was fitted up as a propeller, and as the "Arctic" of that voyage became famous for her staunchness. Upon the return of the expedition the engines were taken out of her and she was returned to the light-house establishment, and in May, 1860, was sent to Smithville, North Carolina, to be there held as a relief light-vessel. Upon the breaking out of the war, she was seized by the rebels and sunk in Cape Fear river, and since the close of the war, has been raised, thoroughly repaired, provided with a complete outfit, towed north, by the tender Iris, as already reported, and is now upon the Hen and Chickens station in the second district.

The first class light-vessel stationed at Martin's Industry before the war, and seized and sunk in the Savannah river by the rebels, has been raised, taken to Savannah and thoroughly repaired. She is now receiving supplies and a complete outfit, and will be ready for service in a very short time.

Buoyage.

The buoyage of this district has received all the attention which the available means would permit. The necessity for a steam buoy tender is very great, and it is hoped the estimate for one which is herewith submitted will be favorably acted upon.

The buoyage to the following entrances is now complete, viz: Cape Fear river, North Carolina; Georgetown, Charleston, St. Helena sound, Port Royal and Calibogue sound, South Carolina; Savannah, Georgia, and Fernandina, Nassau inlet, and St. John's river, Florida.

And incomplete at the following places, viz: North Santee, South Santee, Cape Romain, Bull's bay, North Edisto and South Edisto, South Carolina; Wassaw bar, Sapelo bar, St. Simon's bar, and St. Andrew's inlet, Georgia, and St. Augustine, Florida.

Buoy tenders.

The Narragansett has been employed upon engineer duty, transporting men and materials for the re-establishment of lights in the district.

The Du Pont has been used as a tender upon the works now going on at Cape Canaveral, Florida.

SEVENTH DISTRICT.

The seventh district embraces the coast from south of Cape Canaveral to Egmont Key, Florida.

There are in this district 10 light-houses and lighted beacons; 18 beacons; 57 buoys, exclusive of spare buoys for use in supplying losses; 1 sailing tender.

Various small but important works of repair and renovation have been in progress during the past year, and the general condition of the aids to navigation in the district is satisfactory. At Sand Key the pedestal upon which the lens revolves was found to be much worn and grooved, materially affecting the regularity of the revolutions of the apparatus, and upon which depends its distinctive character. The plate was sent north, turned down and replaced, new facings and trucks supplied.

At Egmont Key the lightning conductor was lengthened by splicing on 29 feet, burner lowered, curtain hooks put up in lantern, new kitchen built.

Key West.—Lamp adjusted and levelled, clock oiled and cleaned, lightning rod lengthened by splicing on 12 feet, leather packing for lamps supplied, feed pipe soldered.

Dry Tortugas.—New wick rings provided, new supply tubes put on burners, burners packed, curtain hooks put up in lantern.

Northwest Passage.—New Franklin lamps furnished.

Dry Banks.—Clock oiled and cleaned, pane of glass set in lantern.

Carrysfort reef.—Revolving machinery cleaned and oiled, apparatus raised and levelled, revolving trucks cleaned, oiled and adjusted.

Cape Florida.—Lamp repaired, new supply tube furnished, arms on lens chimney riveted and soldered, seven pairs of blinds hung.

Jupiter inlet.—Holes drilled and arms on adjusting circle bolted, revolving machinery oiled and cleaned, six panes of glass set in lantern.

Sea-horse Key.—New kitchen built, new insulators for lightning rods supplied.

Florida Reefs.—A complete system for the lighting of the Florida reefs has been adopted by the Board. To carry it into effect, three lights still remain to be built; one of the first-class on Alligator reef, and two other smaller ones on other positions. The first-named is considered the most important, and an estimate of the amount necessary to be appropriated for the commencement of the work is submitted. The estimates for the others are deferred for this year.

Buoy service.

The day beacop on the south point of Gasparilla, which served to mark the entrance to Charlotte harbor, by Boca Grande channel, was blown down in February, 1867, and a buoy placed to mark the danger. This buoy was carried away in June, 1867.

A first class iron can-buoy has been placed to mark Fowey's Rocks, Florida reef, at the entrance to Hawk channel, in 12 feet water.

Small buoys have also been placed to subserve the needs of the new submarine telegraph cable to Havana.

Buoys have also been placed on Middle Ground in Tampa Bay, and one in the small channel leading to the town.

The Rebecca shoal buoy broke adrift in the early part of last December, but was recovered and replaced on the 23d of the same month.

The attention of the board has been called to the necessity of establishing a first-class buoy near the beginning of the shoal water, three miles eastward of Cape Florida, in $3\frac{1}{2}$ fathoms water. It is stated that several vessels have recently had narrow escapes from disaster at this point.

The schooner Narragansett, which was employed on engineer work in this district, while on her way from Key West to New York, encountered a severe storm, November, 1866, and sustained severe injuries. The necessary repairs were made, and being found unsuited to the waters of this district, she was turned over to the light-house inspector at New York, and was assigned to duty in the sixth district.

The regular light-house and buoy tender of the district has received considerable repair during the year, and has rendered good service; but from her insufficient size and character, being unable to attend to the duty of correcting the buoy positions of the entire district, arrangements have been made for chartering, temporarily, a steam vessel to attend to this special work.

The president and engineer of the ocean telegraph line from Cuba to Florida embarked on the United States steamer Tahoma for Havana, to meet the new cable shipped from England. Just at the moment of starting the boiler gave way, and the vessel could not proceed. In this emergency the inspector placed the tender at the disposal of the telegraph officers to convey them to Cuba, which duty occupied the vessel two days.

EIGHTH DISTRICT.

On the 1st July, 1867, by authority of the Honorable Secretary of the Treasury, the former eighth and ninth districts were consolidated, the new district being styled the eighth.

This had become necessary, owing to the provision in the act of Congress organizing the present light-house establishment, limiting the number of districts to twelve, and the extension of our coast upon the Pacific, which created the necessity for an additional district there.

Under the present arrangement there is no ninth district, and the aggregate number of districts remains at twelve.

The eighth district comprises all the coast of the Gulf of Mexico, from St. Mark's, Florida, to the Rio Grande.

The following statement of the operations of the past year, the present condition, and the requirements of the aids to navigation is made in considerable detail, because in this district the destruction of light-house property by the rebels exceeded that in any other, and the consequent expense of the re-establishment of the aids to navigation is great. Much has been done to restore them to their condition before the war, but much yet remains to be done. However, only those stations which are of the least importance remain unmarked, and even they are few in number.

Operations have been greatly delayed by the prevalence of the yellow fever along the entire gulf coast during the present season.

There are in this district 64 light-houses and lighted beacons ; 41 beacons ; 80 buoys, exclusive of spare buoys for use in supplying losses ; 1 steam tender ; 3 sailing tenders.

St. Mark's.—The tower at this station was mined by the rebels, and an attempt made to blow it up. By the explosion of the mine much damage was done to the lower part of the tower, nearly one-third of the circumference for about eight feet being blown out. The dwelling-house was burned.

The work of restoring the station commenced early in September, 1866, and was completed on the 10th December following. The materials were in part carried by the launch *Pharos* from the adjacent stations, *Dog Island* and *St. George*, being those remaining after the completion of the repairs at those places. The lumber was purchased up the *St. Mark's* river at reasonable prices. A lens of the fourth order, fixed, was supplied, and the light was re-exhibited on the night of January 8, 1867. The station is now in good condition.

Pensacola.—The work of re-establishing the *Barancas* and *Caycas*, or *Fort McRae*, range beacons, which were destroyed during the war, was commenced on November 3, 1866, and completed on the 19th of the same month. The rapid execution of this work was in a great measure due to the fact that the wooden structures were framed before being carried to the station. Notwithstanding some delay and difficulty in the way of landing the materials in boats at the *Caycas* range, the five structures, *Bar*, *Barancas*, and *Caycas* range, were put up, whitewashed, and painted ; illuminating apparatus, consisting of steamer's lenses, put up and adjusted, and the beacons ready for lighting, in sixteen days. The force employed consisted of four laborers and two carpenters.

The *Caycas* range was lighted on the 22d December, 1866, and the *Barancas* on the 4th February, 1867, the delay being caused by the failure of the respective keepers to report for duty at the proper time, owing to some misunderstanding.

Sand island.—This station is marked by a temporary wooden tower, which answers the purpose for the present. An appropriation for the complete restoration of the station is now available, but the fact that it was marked, though only temporarily, has caused the attention of the board to be directed to other stations.

Mobile Point.—There are not proper accommodations for the keeper, but Congress having authorized the rebuilding of this station upon a more eligible site, and appropriated the necessary money, it is not deemed expedient to make any improvements in the present structures.

Choctaw Point.—The site of the old light-house was visited on the 17th August, and after examination it was found that the channel at the entrance to *Mobile* river has been so much changed, by the obstructions placed there by the rebels during the war, that a light established at this point would not answer all the requirements of commerce, but, in addition, range lights would be necessary to enable vessels to pass the obstructions. It is thought possible that such a site can be selected that one light will fulfil all the requirements.

In this connection it may be well to remark that other cases exist where the lights, if re-established, could serve no useful purpose, because of changes in the channels they were designed to indicate. The appropriation under which the restoration of the aids to navigation injured or destroyed on the southern coast is carried on being a general one, it is recommended that the board be authorized, wherever such conditions are found, to change the site, so that the structure may stand where it may be most useful.

A draught of the necessary legal provision is herewith submitted.

Round island.—The dwelling and kitchen at this station received some damage during a heavy gale on the 30th April last. No opportunity occurred to make

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the necessary repairs, and, the damage being slight, it was not deemed advisable to send a special expedition, which would have occasioned great expense.

Ship island.—This station is in good condition, a few slight repairs being all that is required.

Biloxi.—The restoration of this station was commenced on September 11, 1866, and completed on the 15th November following. The tower is of cast-iron, resting upon a brick foundation, situated near the edge of a bluff bank of sandy earth. The bank is kept in place by a retaining wall without batter, which also acts as a breakwater. A portion of this wall had fallen, and was rebuilt. The taking down and rebuilding of the whole wall would have involved great expense, and it was therefore deemed best not to do so. With occasional repairs it may last yet for some years, if no very severe gales visit the locality. In consequence of the giving way of the wall the bank had caved in, causing the tower to incline from the perpendicular at least two feet. This was remedied by excavating under the foundation, on the opposite side, until the tower, under the action of its own weight, resumed the vertical position. The plan was easy of execution, involved but little expense, and proved highly successful and satisfactory. The lantern of the tower was repaired and glazed, several of the iron steps renewed, new door supplied, and many smaller repairs made.

The dilapidated dwelling was renovated, new chimneys built, a well dug in the yard, and both tower and dwelling painted—the former with coal tar and the latter with white oil paint.

The apparatus established in the tower is a fifth-order lens, fixed, with Franklin lamps.

St. Joseph's island.—This wooden structure rested upon nine brick columns, eight feet in height. These were founded upon timbers laid upon the surface, which, under the action of the superincumbent weight, sunk several feet. The island is very low, regularly overflowed in high tides, and the soil is soft mud, into which a pole can easily be thrust to a depth of twenty feet. The timber foundations were renewed in 1864, but have since been nearly destroyed by worms, and six of the brick supporting columns have been washed away, their places being supplied by wooden shores.

The necessary repairs had just been commenced, when the breaking out of the yellow fever put a stop to the work, and it has not yet been renewed.

The expense of securing a foundation here is so great that it may eventually become necessary to abandon the site and transfer the station to a point on the south side of the channel, about eight hundred yards south of the present position, in eight feet of water, with a hard sand bottom, where a screw-pile light-house could easily be built. If the present station is maintained, the foundation will have to be rebuilt about once in two years, as the timbers are completely destroyed by worms in that time.

Rigolet, (Pleasanton's island.)—A new lantern having been provided for this station, a party of workmen was sent there, on the 15th of July, to put it in place. It was found necessary to take down and rebuild about four feet of the tower, in order to enlarge the top, to receive the improved lantern-deck. The work was completed on the 16th of August. The roof of the keeper's dwelling is rotten, and requires renewing.

Port Pontchartrain.—The breakwater at this station had needed repairs for the past two years. The concrete was broken up and partly washed away, and the timbers and piling were badly worm-eaten. On the 6th of August last, a party of workmen was set at work to remove the old breakwater, and build a new one. These operations were broken up by the yellow fever, after the breakwater had been completed, but before any concrete had been laid. They were resumed on the 20th of September, and are now progressing rapidly. The roof of the keeper's dwelling is much decayed, and requires renewal, and the

piles under the dwelling are badly eaten by the worms. The revolving machinery of the illuminating apparatus was repaired in July.

Bayou, St. John.—At present there is only a temporary wooden structure at this station. It stands at the extremity of the embankment forming the entrance to the bayou of the same name. The illuminating apparatus consists of a steamer's lens. The screw-pile foundation of the former light-house is still standing, and it is proposed to renew the superstructure, and supply it with a fifth-order lens at an early day, for which purpose an appropriation is now available.

New Canal.—The breakwater should be rebuilt, and a few minor repairs to the keeper's dwelling are required.

Pass Manchac.—This structure was just completed at the breaking out of the rebellion, and sustained some damage from its occupation by the troops of both armies. The repairs consisted in putting up a granite deck and new lantern, supplying new doors, windows, and floors to the dwelling, building a cistern, and placing a lens of the fifth order in the tower. The repairs were commenced in the early part of September, 1866, and were completed on the 10th of December. The station is now in good order.

Tchefuncti.—The restoration of this station was commenced by putting the dwelling in order for the occupation of the workmen, and on the 1st of June the work of rebuilding the tower taken in hand, but suspended for about four weeks in August and September, on account of yellow fever, and resumed in the latter part of September, since which time it has steadily and satisfactorily progressed, and will soon be completed. The station will then be as good as new.

Pass à l'Ouvre.—The tower and dwelling were painted in May, and the revolving machinery repaired in July. The roof of the dwelling needs repairing; a new gallery floor, and a new walk, three hundred and fifty feet in length, from the tower to the dwelling and wharf, are required.

South Pass.—The revolving machinery has been repaired. The tower, a wooden one, is in very best condition, the stanchions being rotten, from the top down for thirty feet, and it is not deemed expedient to repair them, since even then they would be too weak to support the weight of a third-order lantern and apparatus. A third-order lens is now used, but in a lantern of a lower order, in consequence of which a portion of the effect of the lens is lost.

This point is further south than any other at the mouth of the Mississippi river, and the light is usually the first one seen by vessels from the eastward. In view of the importance of the station, and the condition of the present structure, it is recommended that an iron tower be erected, for which an estimate is submitted.

The roof of the keeper's dwelling needs repairing, and the cistern needs a new foundation. A walk and a wharf are required.

Head of the passes.—Extensive repairs are necessary at this station, and a shield is required to protect the exposed portions of the foundation of the dwelling from floating logs and the combined action of the swell and current during high stages of the water. The brick piers of the dwelling have all been knocked away, and it now rests upon wooden posts.

The sills of the gallery are rotten and must be replaced. A working party was sent on the 1st of August to make the repairs, but had hardly commenced, when stopped by the yellow fever. The work has since been resumed, and will soon be completed. The house was painted in May, 1867.

Depot at head of the passes.—The shed for the protection and storage of materials, tools, &c., was completed in May. It was weather-boarded and provided with large gates, so that boats may be hauled into it for repairs. A platform for coal has been built. To meet all the requirements of the district this depot, so eligibly situated, should be greatly extended. An estimate of the amount necessary for immediate purposes is submitted.

Southwest Pass.—This station is in bad condition, but no attempt has been

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made to repair it, because Congress having made an appropriation for a new light-house, the necessary investigations to determine the character of the formation at the proposed site are now going on, and the new work will be urged forward as rapidly as practicable, with a due regard to the stability of the structure.

Barataria bay.—The general condition of this station is good. A few slight repairs to the lantern and keeper's dwelling are required.

Timbalier.—This tower, built upon a low sand beach, near the point of Timbalier island, was encroached upon by the sea, so that in the early part of 1867 it was entirely surrounded by water. On February 9, information was received that the tower was in danger of falling, and on the 20th of the same month workmen were sent to take down the lens and establish a beacon light on top of the dwelling. The lens, a fourth-order fixed, was stored in the keeper's dwelling. On the 29th and 30th of March following, during a hurricane, the dwelling, together with the tower, and everything about the station, was levelled to the ground, and covered with from three to six feet of water. Everything belonging to the light-house, as well as the private property of the keepers, was lost. It seems but just that the keepers, who faithfully performed their duty, barely escaping with their lives, and living for some days in an iron can buoy, should be paid the actual value of their losses in clothing, &c., and an estimate therefor is submitted, with the recommendation that the requisite appropriation be made.

This station is too important to be long left without a light. A screw-pile light-house, of the third order, placed in shoal water inside the island, and sheltered by it from the sea, would be the most economical in the end, and an estimate of the cost of such a structure is herewith submitted for the action of Congress.

Ship shoal.—The continued prevalence of sickness among the keepers at this station led to the supposition that it was caused by the contamination of the drinking water by lead washed into the rain-water tanks from the red lead paint with which the whole structure was painted. The old lead color was scraped and washed off with a solution of caustic potash. This was so perfectly successful that the whole tower looked like new iron which had never been painted. The potash solution was then rinsed off, and hot coal-tar applied in three successive coats. The work was commenced on the 28th of September and terminated towards the end of December, 1866. By far the greater part of the labor was expended in cleaning the tower before the painting could be commenced. At the same time the water tanks, and pipes leading to them, were taken down and cleaned with the greatest care, to remove every particle of sediment. The tanks and pipes were then coal-tarred inside and out, so as to envelop in the tar and render harmless any particles of lead salts which might have escaped the cleaning process. The result of the operation was that the health of the keeper and his assistants at once improved, and there has been no sickness at the place since. The importance of removing the cause of the sickness prevailing at this place cannot well be overestimated. Several persons had been paralyzed, and this fact becoming known was likely to deter any one from accepting the position of a keeper. It is believed that the adulteration of the water with lead was the only cause of the deplorable sanitary condition of the station, and indicates the necessity of avoiding the use of lead paints or lead pipes at any station where the supply of water depends upon the drainage from the structure itself. This station is now in excellent condition.

Southwest Reef.—This iron screw-pile structure was repaired and thoroughly painted with coal tar during January and February of this year.

On the 5th and 6th of October, 1867, that part of the Gulf of Mexico in which this light-house is situated was visited by an unusually severe hurricane. By the violent sea which broke through and about the structure, the gallery around the light-house was torn off, the iron floor stove in, nearly everything

inside the dwelling destroyed, and it is probable that but for the timely breaking off of the gallery the entire light-house would have been destroyed. This damage will be repaired as soon as practicable.

Shell Keys.—This iron screw-pile light-house was thoroughly repaired and painted during January and February last. The hurricane just referred to seemed to be most furious at this point, and the light-house was totally destroyed by it. There are now about four feet of water where it stood. There was but one keeper in the light-house at the time, and he undoubtedly perished, so that no particulars concerning its destruction can be given. An estimate of the probable cost of replacing the light-house is submitted.

Matagorda.—The cast-iron tower at this station was much injured by the rebels in an attempt to blow it up, several of the plates being broken.

During the war the sea encroached upon the site to such an extent that, owing to the undermining of the foundation, the tower was in danger of falling. It was consequently taken down, and the iron sections composing it stored upon the highest part of the island, until the means for replacing the broken plates and the reconstruction of the tower should be available, for which purpose an estimate is now submitted. Meanwhile, a light is exhibited from a fourth-order lens, fixed, varied by flashes, mounted upon a temporary tower.

Aransas Pass.—The brick tower and dwelling were seriously damaged by the rebels in malicious attempts to destroy them. The work of restoring the station was commenced on the 1st of February, 1867, and completed on 15th of April. It was necessary to take down and rebuild about twenty feet of the top of the tower, which had been split by explosions of gunpowder.

The lantern was repaired and a lens of the fourth order, fixed, fitted with Franklin lamps, supplied. The dwelling-house was repaired in a substantial manner and a plank walk built from the dwelling to the tower. During the progress of the repairs one of the severest "northers" ever experienced on the Texas coast occurred. The cold was so intense that fish, thrown ashore by hundreds, were frozen, and birds of all sorts sought refuge in the tower and camp of the workmen, where they perished in large numbers.

Apparatus.—All the light-house apparatus damaged during the war and since recovered, which could be repaired within the district, was retained and used, and such as could not be repaired there was sent to the light-house depot on Staten island.

St. Joseph's bay.—This, the second harbor in capacity and safety on the Gulf coast, and excelled only by Pensacola, is at present without a light. Though there is not, as yet, any important town on the bay, its merits as a harbor of refuge for ships of any size would justify the expense of a light-house of the fourth order, which would be sufficient to render the bay accessible at night. An estimate of the cost of such a structure is submitted for consideration.

Grand Grozier.—One of the most dangerous shoals in the Gulf of Mexico, and one upon which many vessels have been wrecked, is Grand Grozier. This shoal and the low island of the same name, which is overflowed in high water, are situated about twenty-two miles north of Pass à l'outre. The approaches are gradual and regular, but the currents, which are strong, are apt to betray the mariner and mislead him to this dangerous ground. An estimate of the cost of an iron light-house of the fourth order, to mark this danger, accompanies this report.

St. Andrews's bay, Florida.—This bay, upon which there are many settlements, affords a secure harbor for vessels drawing twelve feet. Situated about midway between Pensacola and St. Joseph's bay, it is of some importance as a harbor of refuge. The ground on the headlands forming the entrance is hard sand, and sufficiently elevated to afford security to a brick structure of the fourth order, for which an estimate is submitted.

Buoy tenders.

The steamer *Geranium*, schooner *Florida*, and launches *Susan* and *Pharos* have been constantly engaged as tenders upon the works of construction and restoration, being particularly occupied in transporting men and materials, in which capacity they have been of great service. In July last a new foremast was put in the *Florida*, and the two launches thoroughly repaired, including a new set of sails.

Buoyage, &c.

During the past year the buoyage of this district has progressed nearly to completion.

The entrances to St. Mark's, middle pass into Appalachicola bay, and St. Blas have been newly buoyed. The stakage of St. Mark's river and Appalachicola bay has not yet been completed. The necessary timber for staking these channels has been purchased, and so soon as the service of a suitable vessel is available the work will be taken in hand.

A first class buoy has been moored on Ocklockonee shoal, near St. Mark's.

Another buoy of the same class will be required to mark a shoal to the westward of Ocklockonee.

A new first-class iron buoy has been moored at the outer bar, Pensacola, in place of one carried away.

A spar buoy has been placed to mark a wreck near Grant's Pass.

A second-class iron buoy has been placed in Galveston bay, north channel, to mark a wreck.

Two second-class iron buoys in Galveston bay and one in Southwest Pass, Mississippi river, have been lost by reason of having been run into. The latter was replaced by one of the same kind, and the former by spar buoys.

A number of iron buoys of different sizes and varying in condition have been found at different points within the district, and those worthy of it have been repaired and are now in use.

TENTH DISTRICT.

The tenth light-house district embraces all lights and other aids to navigation on Lakes Erie and Ontario, and the rivers St. Lawrence and Niagara and their tributaries.

There are in this district 44 light-houses and lighted beacons; 79 buoys, exclusive of spare buoys for use to supply losses; 1 steam tender, which attends to this and the 11th district.

The general condition of the aids to navigation in this district is satisfactory.

Sisters' islands, in St. Lawrence river.—An appropriation is still available for the erection of a beacon-light on one of these islands, and the prosecution of the work is only awaiting the perfecting of the title papers to the site.

Horseshoe reef, in Niagara river.—The foundation pier upon which this beacon-light is situated having been found to have sustained serious injury by the ice of last winter, the necessary materials for its repair are now being collected, and the work will be pushed to completion before the close of navigation.

Galloo island.—The work of rebuilding this light-house, which was suspended at the close of navigation last fall, was resumed early in the spring, and completed.

Cleveland.—The attention of the board has been called to the insecure condition of the main light at this place—a consequence of the removal of earth from around its base in grading streets. No steps have been taken by the city authorities toward securing the foundations of this tower. No immediate danger is, however, apprehended, and no expenditure upon this station is contemplated during the ensuing season. The danger of the destruction of the tower is growing more and more imminent, and it is recommended that an appropriation be made for a new tower, with keeper's dwelling, to be constructed at the end

of the East Harbor pier, at this place, to take the place of both the present lights—main and beacon. When this new light is completed, the two lights now in use may be discontinued.

Cedar Point, Ohio.—Under authority of Congress, a beacon-light, on an outer range at this place, has been constructed, and the light exhibited.

West Sister island, Lake Erie.—Plans and estimates for renovating this light-house tower, for which work an appropriation was made at the last session of Congress, have been approved, and materials have been collected with a view of commencing the work early next spring.

Maumee bay, Ohio.—The titles to the several tracts of land as sites for range-lights, at this place, having, after much difficulty and unavoidable delay, been finally perfected, the work of constructing these lights will be commenced as soon as practicable.

Various repairs and renovations, involving important but generally inexpensive improvements, at the following named stations, are found to be necessary, and will be attended to as rapidly as time and means will permit: Ogdensburg, Cross-over Island, Sunken Rock, Rock Island, Tibbett's Point, Horse Island, Stony Point, Oswego, Big Sodus, Genesee, Niagara Fort, Dunkirk, Erie, Conneaut, Ash-tabula, Grand River, Black River, Vermillion, Huron, Sandusky, Port Clinton, Green Island, West Sister, Monroe, Gibraltar, Mamajuda, and Grassy Island.

Buoyage.

The buoyage of the district is in good condition, and but few changes or additions have been made during the past year.

Suitable buoys have been placed to mark the extremity of a dangerous reef of rocks lying about one and one-half mile northwest from *Galloo island*, Lake Ontario, having on it but three or four feet of water. This shoal, in extent about three-fourths of a mile, and which has not heretofore been buoyed, lies in the direct route of vessels from Oswego to Ogdensburg.

ELEVENTH DISTRICT.

The eleventh district embraces all of that portion of the lake region (including affluents) above Detroit, Michigan, and comprises about nineteen hundred (1,900) miles of coast line.

There are in this district 63 light-houses and lighted beacons; 80 buoys, exclusive of spare buoys for use to supply losses; 1 steam tender, which attends to this and the tenth district.

Windmill Point.—A store-room of stone attached to the tower has been built at this station.

The characteristics of the light have been changed from a fixed white to a fixed white varied by red flashes.

St. Clair Flats.—The timber crib requires some repairs, also the plastering in the dwelling. The crib upon which the beacon is erected has settled some, but no damage of any importance is expected to result.

An appropriation of sixty thousand dollars (\$60,000) is available for ranges to complete the lighting of the channel over the flats. It being understood that a material change in the channel will probably be made, it was deemed prudent to wait until that question was determined. So soon as the excavation of the new channel is sufficiently advanced to warrant it, the construction of the necessary range-lights will be commenced.

Fort Gratiot.—Owing to the number of lights exhibited about the railway depots, and other buildings in the vicinity, it was thought necessary to make a change in the characteristics of this light, which was done by substituting for the fixed white lens in use there, the fixed, varied by flashes lens of Point aux Barques—the Fort Gratiot lens taking the place of the latter.

Point aux Barques.—The characteristics of the light were altered by changing the lens as indicated above. The range of light is considerably interfered with by trees on a point of land to the southward and eastward. These must be removed.

Ottawa (Tawas) Point.—The tower requires repairs, and the floor of the kitchen needs renewal, as well as the wooden platform around the dwelling.

Sturgeon Point.—Efforts are now being made to procure a title to the site necessary for the light-house at this point, for which an appropriation is now available. So soon as the title is obtained, the work will be taken in hand.

Trowbridge Point.—An appropriation for a light-house at this point is now available. By the terms of the act making the appropriation, the light-house must be built "on a proper site at Trowbridge Point, Thunder bay," &c. The object in recommending this appropriation was to establish a guide into Thunder bay, and to mark the mouth of Thunder Bay river, one and a quarter mile southwest from Trowbridge Point. At the time the estimate was submitted it was supposed that this could be best accomplished by a light on Trowbridge Point, but subsequent examination has shown that the proper site is at or near the mouth of the river, into which vessels and steamers now regularly pass to the town of Alpena. This town, which is said to contain two thousand inhabitants, and is rapidly increasing in size, is situated at the mouth of the river. It is therefore recommended that the terms of the act be so changed as to permit the location for the light-house to be chosen accordingly.

Thunder Bay island.—The rebuilding of the keeper's dwelling having been authorized by Congress, and the requisite appropriation made, the work will be completed next season. A considerable portion of the material has already been delivered at the site.

Presqu' Ile.—The new dwelling authorized by Congress for this station, and for which an appropriation is available, will be built during the coming season. A portion of the requisite materials have been delivered.

Bois Blanc island.—An appropriation for repairs and renovations at this station having become available, on the first of July last the work was taken in hand, and will be completed before the close of the present season. The keeper's dwelling, with tower attached, is entirely new.

Cheboygan.—The lantern is on the keeper's dwelling, the foundation of which is being undermined by the action of the sea. This will be attended to, as well as some necessary repairs to the building itself.

Straits of Mackinac.—Steamers and other vessels plying between Lakes Michigan and Superior pass through the so-called north channel of the Straits of Mackinac, as do also numerous steamers during the summer months running between the lower lakes and ports on Lake Michigan or Green bay. To all these a light marking the channel between Round island and the Island of Mackinac would be of great service. An appropriation was once made for this purpose, but, owing to imperfections in the title to the proposed site, the light-house was not built and the appropriation lapsed to the surplus fund. It is understood that the title can now be perfected, and the estimate is therefore renewed with a sufficient addition to cover the increased cost of materials and labor.

McGulpin's Point.—A site of ten (10) acres has been selected for this light-house, (for which an appropriation is available,) and proceedings in condemnation under the laws of the State of Michigan have been instituted for the purpose of obtaining title. It is hoped that this may be secured in time to permit the building of this much-needed light-house during next season.

Waugoshance.—The work of protecting the foundation of the tower and other buildings at this important and exposed station was taken in hand early this season and has progressed satisfactorily. It is proposed to build a stone pier of protection instead of repairing at great expense the former wooden one, which would in a few years require a repetition of the work and consequent expense.

When the stone pier is built—founded, as is intended, upon the bed rock—no essential repairs to it will be required for many years. The work of excavating for the foundation of this pier is carried on under unusual difficulties, as was anticipated from the exposed locality and the formation of the reef of boulders upon which the tower stands. At the date of the latest reports from there (October 25) the excavation had reached a depth of six (6) feet below the surface of the water, and was progressing at such a rate as to lead to the belief that the depth of twelve (12) feet would be reached before the close of the season. At the latter depth it is expected that the bed rock or a foundation quite as good will be reached.

Skillagalee, (Ile aux Galets.)—A tower of one hundred (100) feet in height, with a keeper's dwelling attached, is under construction, with a view to the greater efficiency of the station. The light is now of the sixth (6th) order. Upon the completion of the new buildings a third-order lens will be used and the range will be increased from eleven to fifteen miles. With favorable weather it is expected that the masonry of the new structures will be completed this season.

Beaver Island harbor.—This excellent harbor of refuge, accessible with all winds and affording shelter to large fleets of vessels during the gales of spring and fall, is but indifferently lighted. A steamer's lens, exhibited from a low tower with a lantern of old and inferior pattern, affords but a very dim light. The tower walls (of brick) are badly cracked, and the tower, which is joined to the dwelling by a passage way, does not rise above the roof of the latter. It is proposed to improve this station by building a new and higher tower, repairing the dwelling, putting a new roof upon it, and supplying a more effective lens, to meet the expense of which an estimate is submitted.

Beaver island.—The efficiency of this light is impaired by trees situated on the points to the eastward and westward of the tower. These should be removed. The cistern needs rebuilding.

St. Helena island.—This island affords an excellent anchorage during westerly and southwesterly gales. It is nothing unusual to see a fleet of fifty sail at one time at anchor under the island. It is low, and the main land to the north of it being high, the island, when approached from the southward, can be seen but a short distance. A light here would be of much service, and an estimate of the cost of one is submitted.

South Fox island.—An appropriation for a light-house on this island became available on the 1st July last. The title to a portion of the requisite land at the site yet remained in the government, and the necessary reservation was made. The remainder was purchased from the State of Michigan, and upon the approval of the title by the proper authority, the work was taken in hand and completed in time to exhibit the light, for the first time, on the night of November 1, 1867. It is of the fourth (4th) order, revolving, red.

South Manitou.—The keeper's dwelling requires extensive repairs, including plastering, eave-troughs, gutters, &c., &c. They will be attended to.

Point Betsy, (Point aux Becs Scies.)—At this station a new roof to the keeper's dwelling is required; also other repairs of less importance—all of which will receive attention.

Grand Point au Sable.—This station, for establishing which an appropriation became available on the 1st July last, was lighted for the first time on the night of November 1, 1867. The buildings consist of a tower one hundred (100) feet in height, and a keeper's dwelling. The illuminating apparatus is a lens of the third order, showing a fixed white light.

Muskegon.—At present the light at this station is exhibited from a wooden tower surmounting the keeper's dwelling, which is old, and no longer worth repairing. With the appropriation now available, it is proposed, during next season, to rebuild and otherwise improve the station.

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Manistee.—An appropriation for a light-house at this harbor is now available, and as soon as the title to the selected site is perfected, the work of construction will be commenced.

White river and South Haven.—Appropriations for light-houses at these points are available, but it will be impossible to decide upon the proper structures and sites, until the improvements now going on at these harbors are completed.

Grand Haven.—An appropriation for a new lantern at this station is now available, and to avoid erecting a temporary light while the change is being made, it will be placed in position during the coming winter. At the same time some repairs to the keeper's dwelling and the hoisting apparatus will be made.

Kenosha.—The tower which was in course of construction at this station at the date of the last annual report was completed before the close of the year, and on the opening of navigation last spring, the light (a fourth order fixed, varied by flashes) was again exhibited, and at the same time a fixed red light was shown from the beacon at the end of the north pier of the harbor. A new dwelling has also been completed, and the light-house lot covered with soil, brought from the main land, to prevent the further shifting of the sand; and the station is in efficient condition in every respect.

Milwaukee.—During the coming winter the lantern at this station will be replaced by a new one, for which purpose an appropriation is now available.

Bayley's harbor.—An appropriation is now available for rebuilding this station. The necessary materials will be landed at the site before the close of navigation this fall, and the work commenced early in the spring and finished during the season.

This is the only harbor of refuge on the western shore of Lake Michigan, between Milwaukee and Port du Mort. It affords an excellent shelter and good anchorage in northerly and easterly winds. The present light-house marks it, and at the same time serves a valuable purpose as a coast light for vessels keeping the western shore while running down the lake.

But the numerous shoals at the entrance make it a difficult task to enter the harbor, even in day-time, and almost impossible at night. Several vessels have been wrecked in attempting it, and the harbor is consequently in bad repute.

A range of lights on the western shore of the harbor would entirely obviate the difficulty, enabling vessels to enter with ease either by day or night. An estimate of the cost of the requisite range is submitted, and its favorable consideration recommended.

Poverty island.—The already large and rapidly increasing commerce to and from the northern end of Green bay and lower lake ports now takes in daylight the northern passage from Lake Michigan into Green bay, because of its being much shorter and more direct. To enable vessels to use the same passage in the night, a light-house on Poverty island is necessary, and an estimate of the cost of building one is herewith submitted.

The necessary reservation of the island for light-house purposes has been made.

Green bay.—An appropriation of twenty-five thousand dollars for "additional aids to navigation in Green bay," &c., is now available. With this it is proposed to build a light-house on Chambers island, (Manomah,) where a site has been secured and the title recently perfected; and a day beacon upon Whale's Back, a dangerous reef directly in the track of all vessels bound up or down Green bay passing through the Port du Mort passage.

The work will probably be completed during the coming season.

Sand Point.—The title to the site for a light-house at this point having recently been perfected, the work will be pushed forward under the appropriation available for that purpose. It is expected that the light will be exhibited for the first time on the opening of navigation next spring.

Eagle Bluff.—It was intended to build a light-house at this point during the

present season, under the appropriation available for that object, but deeming the case of Sand Point more urgent, the working party was transferred there.

The necessary materials will be delivered at the site this fall, and the work taken in hand upon the opening of navigation in the coming season.

Point Iroquois.—The dwelling and tower (of stone) require repairs, and a new lantern deck of iron, to take the place of the old wooden one, should be provided.

Grand island.—Under the appropriation available for that purpose, the old tower and dwelling at this station were torn down during the present season, and entirely rebuilt. The station is now in excellent condition.

Grand Island harbor, West channel range lights.—It was expected that this range would be completed during the present season, the work being done after the completion of Gull Rock light-house by the party engaged there, but the death (by drowning while engaged in the discharge of his duties) of Mr. William Tunbridge, the foreman in charge of the party, seriously deranged the programme of operations on Lake Superior, and it was not possible to accomplish all that was intended. The work will be taken in hand early next season, and its completion not long delayed. An ample appropriation is available for the work.

Grand Island harbor, East channel.—The beacon to guide through the east channel into Grand Island harbor, has been delayed for the reason given in the case of the west channel range. Under the ample appropriation available, the work will be completed early in the coming season.

Lake coast light between White Fish Point and Grand Island harbor, Lake Superior.—The distance between White Fish Point and Grand Island harbor is about eighty miles, at present unmarked by a light. Vessels always follow the south shore except in a few remarkable cases, and the absence of a light for this very considerable distance has been seriously felt. The exact site for the light-house cannot be indicated until the surveys of that locality made during the present season are brought together and mapped. The amount of the estimate submitted is sufficient to establish a light station of the required character on any site that is likely to be selected.

Granite island.—An appropriation is now available for establishing this important station; proceedings have been instituted for the condemnation of the whole island (which is very small) under the laws of the State of Michigan. As soon as these proceedings are complete and title vested in the United States, the work will be taken in hand and finished as soon as possible.

West Huron island.—An appropriation for building this station became available the 28th of July, 1866, but it was not until the 2d of September, 1867, that the title to the site was perfected—too late to do anything more during the present season. The work will be taken in hand early in the spring, and will be completed during the season.

Portage entry range lights.—The title to the proposed sites of these lights has recently been perfected, and under the appropriation now available for the purpose it is intended to establish the lights during the coming season.

Mendota.—An appropriation for a light-house at this place is now available, and efforts are being made to procure the requisite title to the proposed site. As soon as this is accomplished proposals for the construction of the necessary buildings will be called for, the law making the appropriation requiring that the work be done by contract.

Copper harbor range lights.—At this station the keeper has heretofore occupied for a dwelling one of the buildings of Fort Wilkins, which had been transferred to the light-house establishment for that purpose. Recently the War Department has required the re-transfer of the Fort Wilkins buildings, and it consequently becomes necessary to build a dwelling for the keeper to live in. An estimate of the amount to be appropriated, to provide the requisite building,

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in addition to the balance remaining after the completion of the range lights, is herewith submitted.

Gull Rock.—An appropriation for a light-house on this rock, to mark the passage between Manitou island and Keweenaw Point, having become available on the 28th of July, 1866, the site was secured by a reservation of the rock for light-house purposes. The work was commenced early in the present season, but its completion was somewhat delayed by the death (already referred to) of Mr. William Tunbridge, the foreman in charge. The light was exhibited for the first time on the night of November 1, 1867. The illuminating apparatus is a lens of the fourth order, fixed, red.

La Pointe.—At this station the shifting of the sand, under the action of the wind, has caused great annoyance, and in order to protect the foundation of the buildings considerable expense has been incurred. The effectual remedy is to cover the surface for a little distance on each side of the buildings with stone, which must be carried there from Raspberry island. This will be done during next season.

Michigan island.—This light was discontinued in 1858, but it seems to be desirable to re-establish it. Since its discontinuance the buildings have fallen somewhat into decay, and a small appropriation is required to put them in good order again. The requisite estimate is submitted herewith.

Braver bay.—This is a small lumbering station on the northern shore of Lake Superior. Further examinations are necessary before deciding upon the site and character of the light-house at this place, for which an appropriation is now available. Nothing can be done before next season, and even then more important localities must take precedence in order of time.

Stannard's Rock.—An appropriation is available for the establishment of a day beacon to mark this dreaded danger. During the present season much information concerning it has been collected, though no decision has yet been arrived at as to the best means of carrying into effect the design of the law. But it is expected that before the opening of navigation next season a programme of operations will be matured, and the work possibly be completed before the next annual report is required.

Repairs of considerable importance are required at the following named stations: Michigan City, Pottawatamie, Eagle harbor, Eagle river, and Raspberry island, and of less consequence at Saginaw bay, Détour, St. Joseph's, Chicago, Waukegan, Racine, Port Washington, Sheboygan, Manitowoc, Round island, White Fish Point, Portage entry, and Minnesota Point.

Buoyage.

The buoyage of the district seems to have been well attended to, as no complaints of inefficiency have reached the board.

Tenders.

Before this season the supply and inspection service of the district was performed but indifferently with one sailing vessel. She could not possibly make more than one tour during the same season, and could spare but little time to devote to the buoyage of the district. The services of a tender upon the works in progress at Waugoshance being necessary, a steamer (the Haze) was purchased in New York and taken to the lakes by way of the St. Lawrence river and the Canadian canals. Upon her arrival, it was deemed expedient to transfer the sailing tender Belle to the duty of attending the Waugoshance works, and to use the steamer for the purpose of supplying and inspecting the light stations in the eleventh district, and, upon the completion of that duty, to employ her in transporting materials for building the new light-houses provided for by law in

the same district. She has been actively and very profitably engaged upon these duties, and has saved to the light-house establishment large sums which would have been expended in chartering vessels for the purpose.

After this season she will be used in supplying and inspecting all the light stations in the two districts—tenth and eleventh—and her spare time, if she has any, will be employed in aid of the works of construction and repair in the same districts. The sailing tender *Watchful*, heretofore used in the tenth district, has been sold, being, since the purchase of the steamer, no longer necessary.

Thus the steamer has relieved two sailing vessels, performing all their duties and having enough time in excess to enable her to devote a considerable portion to duties not heretofore performed by the sailing-vessels.

TWELFTH DISTRICT.

This district embraces the Pacific coast, from the southern boundary of California to the 41st parallel of latitude.

There are in this district nine light-houses and lighted beacons, and no light-vessels.

At the date of the last annual report this district comprised the entire Pacific coast of the United States, but upon the recommendation of the board, the honorable Secretary of the Treasury authorized the division of that coast into two districts, the 41st parallel of latitude being the line of separation, and which division was carried into effect on the 1st of July, 1867. This recommendation was based upon the reason that, in consequence of the great extent of coast-line originally assigned to the 12th district, and the difficulty and delay in reaching or communicating with many of the stations, the duty of properly attending the various and important aids to navigation could not be performed by one inspector with that promptness and care which the interest of the service required.

At *Point Loma* the roof of the keeper's dwelling was resingled and the plastering on two of the rooms renewed.

At *Santa Barbara* some repairs are required to the cellar, and some slight renovation of plastering. The lens apparatus requires the addition of one or more panels, the present arc of illumination being limited to 180°, and vessels approaching outside of this angle cannot see the light.

At *Point Conception*, the cistern requires some repairs, leaking badly. A wooden shed is also needed at this station, large enough to shelter the horse and cart provided for the uses of the station, and also to store fuel.

Point Pinos requires slight repairs to the roof and cistern. They will be made by the keeper.

At *South Farallon*, the roof of the keeper's dwelling will probably have to be renewed during the next season.

At *Fort Point*, the fog-bell was taken from its original position on a framework in front of the fort and hung on an angle of the fort facing seaward. Slight repairs have been made to the dwelling.

At *Alcatraz* some needful but inexpensive renovations were made.

At *Humboldt bay*, the breakwater of logs which was constructed last year seems to have answered the purpose of protecting the foundation of the structure, although the sand on the spit is constantly changing, and it is not improbable that the breakwater may at some future time be washed away and the stability of the light-house endangered. In this view of the case the board has under consideration the propriety of removing this light to a point about four miles south of the entrance to Humboldt bay, known as Table bluff. This point is salient, with a firm and permanent foundation for a light-house, and a light there would subserve the purposes of navigation better than where it is now placed; it is not so frequently enveloped in fog as the spit where the light now stands.

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At *Cape Mendocino* the necessary examinations were made to select a proper site for the light-house authorized by Congress, and upon approval of the plans and estimates the work was commenced. The necessary materials were purchased, and as a means of facilitating transportation the services of the steam tender *Shubrick* were called into requisition. Two small sailing vessels were in addition chartered to carry brick, the *Shubrick* taking all other materials. This cape is exposed in all directions to the heavy swell of the ocean, rendering the work of landing materials one of considerable difficulty, and greatly enhancing the cost of transportation. One man was drowned in the surf whilst engaged in landing brick. Most of the materials (other than brick) have been landed. It is expected that the dwelling will be completed by the end of November, 1867, provided the materials can be landed.

On the 8th of September, during a fog, the steam tender *Shubrick*, whilst on her way from San Francisco with materials for the structure, went ashore about thirty miles below Cape Mendocino, and will probably prove a total loss. The necessary steps were promptly taken, and if any part of the vessel or machinery can be recovered at reasonable cost it will be done.

At *Point Arena* and *Point Reyes* examinations have been made with a view to determine the proper sites for light-houses authorized by Congress, and no time will be lost in securing the establishment of proper lights at the earliest practicable day. The exorbitant price asked by the owners of *Point Reyes* for a site there has delayed operations at that point for several years.

An examination has also been made of the reef of rocks off Cape Blanco, and also of Cape Blanco itself, with view of selecting a site for the proposed light there. This inspection resulted in the selection of the station on the main land, and the title papers are now in the hands of the Attorney General for examination. No time will be lost in the commencement and prosecution of this important work.

A careful reconnoissance of the coast between Santa Cruz and San Francisco has been made, for the purpose of determining upon sites for light-houses. Amongst those found to be of the greatest importance was *Point Año Nuevo*, where a light-house of the first order is required, and the necessary estimate therefor is herewith submitted.

Efforts are now being made to procure title to the site selected for a light-house at Santa Cruz, which work has been authorized by Congress, and will be proceeded with as soon as the title to the site is complete.

Fog-signals.

Considerable complaint has been made of the fog-signals at the entrance of San Francisco bay. These signals are bells at Fort Point and Point Bonita. The bell at the latter place is thought to be placed too high above the sea, and for that reason cannot be heard seaward, the prevailing wind carrying the sound inland. The removal of this bell to a point near the water would, from the bluff nature of the bank, be attended with considerable difficulty and expense.

Buoyage.

The buoyage of the district has received as careful attention as the exigencies of the service would permit, but in the discharge of this duty the inspector has been without the services of the steamer *Shubrick*, which at the date of the last annual report was in the service of the United States revenue marine as a cutter.

She was turned over to the Light-house Board in January, 1867, but in a condition requiring immediate and expensive repairs.

Temporary expedients in the way of repair were resorted to in order that

certain pressing engineering works might be accomplished, deferring until their completion the thorough repairs required by the vessel.

It has been above stated that whilst on this engineer duty she was wrecked. The inspector has thus been during the year, and is now, without the services of a tender.

THIRTEENTH DISTRICT.

The thirteenth district embraces the Pacific coast, north of the 41st parallel of latitude.

There are in this district nine light-houses and lighted beacons.

The short length of time which has elapsed since the creation of this district will account for the few remarks to be made in reference thereto.

The several light-houses embraced within its limits are reported to be in a satisfactory condition.

Crescent City.—Keeper's dwelling reshingled; several new rafters put in roof; floor timbers repaired; wood shed built.

Cape Gregory.—Tramway, which was partially washed away last winter, has been repaired.

Cape Hancock.—A revetment to protect the foundation of the tower has been built and boat-house provided. The dwelling house at this station is deemed too small and inconvenient for the purposes of a first-order light. The cellar purging last winter was nearly half full of water from tide and drainage. It is proposed to fill up the cellar and provide other accommodations for storage.

Shoalwater bay.—Some small repairs needed at this station were made. It is proposed next season to reshingle the keeper's dwelling and to construct a strong fence or bulkhead around the structure, as a means of securing the foundation.

The alleged inutility of this light has been brought to the notice of the board, and its discontinuance recommended, but the inspector of the district in a recent letter reports that the commerce using that light has somewhat increased during the past year, and promises to still further increase hereafter. For this reason the board will not at present propose the extinction of this light.

Buoyage.

The inspector reports that the buoyage of *Gray's harbor* and *Columbia river*, which had not received for some years past that attention which their importance required by reason of the difficulty of having these aids suitably attended within the means appropriated, is now in a state of efficiency. The duty of attending buoys in this locality is one of unusual difficulty in consequence of the shifting nature of the channels, but every effort will be made to place them as promptly as the alterations of channels can be ascertained.

All of which is respectfully submitted.

W. B. SHUBRICK,

Rear-Admiral and Chairman.

ANDREW A. HARWOOD, *Naval Secretary.*

O. M. POE, *Engineer Secretary.*

Hon. HUGH McCULLOCH, *Secretary of the Treasury.*

REPORT OF THE LIGHT-HOUSE BOARD.

[Light-house Board of the United States, organized in conformity to the act of Congress approved August 31, 1852.]

LIST OF MEMBERS.

Hon. Hugh McCulloch, Secretary of the Treasury, *ex officio* President.
 Rear-Admiral W. B. Shubrick, U. S. Navy, Chairman.
 Professor Joseph Henry, LL.D., Secretary Smithsonian Institution.
 Brevet Brigadier General Hartman Bache, colonel corps of engineers.
 Brevet Major General Richard Delafield, brigadier general corps of engineers.
 Rear-Admiral C. K. Stribling, U. S. Navy.
 Professor B. Peirce, LL.D., Superintendent Coast Survey.
 Commodore A. A. Harwood, U. S. Navy, Naval Secretary.
 Brevet Brigadier General O. M. Poe, major of engineers, U. S. A., Engineer Secretary.

COMMITTEES.

FINANCE.

General Delafield.		Admiral Stribling.
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ENGINEERING.

General Bache.		General Delafield.
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LIGHTING.

Professor Peirce.		General Bache.
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LIGHT-VESSELS, BUOYS, ETC.

Admiral Stribling.		Professor Henry.
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EXPERIMENTS.

Professor Henry.		Professor Peirce.
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The chairman and secretaries are *ex officio* members of all committees.

TREASURY DEPARTMENT,
 OFFICE LIGHT-HOUSE BOARD,
 Washington, D. C., November 6, 1868.

SIR: I have the honor respectfully to submit for your consideration and for the information of Congress a report of the operations of the light-house establishment during the past year.

It will be seen that particular attention has been given to the important subject of ear-signals as aids to navigation, and to the not less important investigation of the question as to the best means for light-house illumination, with a view to economy and power.

Nothing indicates the liberality, prosperity or intelligence of a nation more clearly than the facilities which it affords for the safe approach of the mariner to its shores.

The introduction and improvement of these facilities are every year becoming more and more important, since the number of lives and the amount of property exposed to the dangers of the sea are increasing with time in a geometrical ratio; and notwithstanding the aids which have been afforded navigation and the perfection of the art itself, the number of marine disasters which are annually reported is truly frightful.

Our own government has given special attention to this important subject, and though our coast line far exceeds in extent that of any other nation, yet it is second to none in the means which it offers for the safety of the mariner. The provisions afforded by accurate maps of the marine topography of our coast, and the system of lights, beacons, buoys and signals which have been established, indicate the liberal views which are held and have been acted upon in regard to this matter. The idea is no longer entertained that expenditures on aids to navigation are confined in their effects to the prosperity of the maritime portions of our country. It is now well understood that whatever affects the commerce of the nation affects all its interests, those of the interior as well as those of the immediate vicinity of the sea.

It need scarcely be stated that the facilities afforded by maps and signals, to be of real value and not delusions as to danger, must be founded upon precise principles of science and well established facts of experience. The maps furnished by the government surveys are characterized by an accuracy which leaves nothing to be desired, and it has been, from the first, the design of the Light-house Board not only to adopt the best methods of illumination and signals already in use, but also by original experiments and researches to improve the system itself, in which the prosperity and common humanity of the world are interested.

We may be allowed to say that the proper discharge of the duties of the Light-house Board involves acquirements, if not talents, of no ordinary character, such as skill in seamanship, practical knowledge of engineering, the abstract principles of mathematics, of physics and chemistry. In accordance with these requirements the organization of the board includes two officers of the navy, two officers of the engineer corps of the army, two civilians of a scientific character, well versed in original investigation, and two executive secretaries, one an officer from the navy, and the other from the engineering department of the army. In order that these may work in harmony they are placed under the direction of the department having the care of commerce.

The result of this organization, and the manner in which the board, in accordance with it, has discharged its duty, are evinced by the history of the operations connected with this service. Since its establishment the number of lights has been more than doubled; the old system of reflectors, which was previously in use, has been replaced by the more effective apparatus of Fresnel, and the efficiency and economy of every part of the service have materially been advanced. At the commencement of the operations of the board the only material used for illumination was sperm oil, but the gradual diminution of the supply of this substance induced the board to attempt the introduction into this country of the cultivation of colza, and the production of oil from this plant. For this purpose a quantity of rape seed was imported and distributed through the Agricultural Department to farmers in the western States, but the supply of colza oil produced was not more than sufficient for domestic use, and by no means enough for general adoption in the light-house service. In consideration of this condition of affairs a series of investigations were undertaken by the board in regard to different materials for illumination, which has resulted in the introduction of lard oil, as not

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only a much cheaper material, and one to which there is scarcely any limit of supply in this country, but also as better adapted to burning in light-house lamps than any other illuminating fluid which has, as yet, been proposed. The principal objection to the use of this material at first was its tendency to solidify at a slight reduction of temperature; but this has been effectually overcome by an arrangement of the lamps, in which the heat evolved at the point of combustion is applied to keep the oil in a liquid condition. The introduction of lard oil was gradual, being first used in the larger lamps, while the smaller ones were still supplied with sperm or colza; but during the last year it has been successfully introduced into lamps of all sizes, and in every position in which lights are required along our seaboard.

Various propositions have been urged upon the board for the introduction of kerosene and other forms of petroleum; but, after a careful series of experiments in regard to this substance, its use has been discarded, with a single exception, namely, that in which a small quantity of it is mingled with lard oil, for burning during cold weather on the light-ships; but even this application is not approved, and will be discontinued as soon as lamps of a form better adapted for this service can be constructed.

The reason for not using petroleum is the danger arising from its highly inflammable character, and the explosiveness of its vapor when mingled with atmospheric air. In the larger lamps of the light-house service a degree of heat is evolved sufficient to cause the ignition at once of the whole mass of the liquid, instead of confining the combustion to that part which is drawn up into the wick. In the smaller lamps danger principally arises from the vapor evolved from kerosene by the heat of the lamp, added to the ordinary temperature of the room. Ten per cent. of this vapor, of a given density, diffused through the air in the space above the oil in the reservoir, produces a detonating compound, which is capable of exploding with the violence of gunpowder, and of thus causing accidents of the most serious character. When an explosion of this kind takes place, the reservoir is usually broken in pieces, the oil ignited, and, while in a state of intense combustion, is projected in every direction. The danger is enhanced from the fact that the burning oil cannot be extinguished by water, but floats and burns on the surface of this liquid. Even the mixture of five or ten per cent. of kerosene with lard oil is not free from danger; the two ingredients of this compound do not enter into a chemical combination, and the explosive vapor is evolved with almost as much readiness from the mixture as from kerosene alone.

One difficulty in the way of the introduction of lard oil was the want of some definite means by which the illuminating quality of the samples could be determined. This difficulty, as stated in a previous report, has been overcome, and a system of scientific precision introduced, by which the board is always assured that the article accepted is in strict conformity with the terms of the contract. For making the test of the oil, and other experiments connected with materials used in the light-house service, a photometric room and laboratory have been established at the depot at Staten island. At this place, also, for the better preservation of the oil, and to facilitate the inspection, a large vault, furnished with five tanks, each capable of containing 10,000 gallons of oil, has been constructed. The tanks, which are kept at a nearly uniform temperature during the whole year, preserve the oil from deterioration due to chemical changes, prevent the loss by leakage, and facilitate the precise measurement of the quantity which has been received, as well as that which is on hand at any time, by merely inspecting a graduated index.

The board has also introduced important improvements in the lamps usually supplied by the makers of the Fresnel apparatus. These are of two classes, the mechanical lamp and the moderator lamp. In the former the oil is pumped up to the burner from a reservoir below by clock-work; impelled by the descent of a heavy weight. This apparatus is of a complicated character, and is subject to derangement; the valves must be renewed from time to time and the clock-work cleaned. The proper performance of these operations is beyond the skill of an ordinary keeper, and requires the frequent aid of a trained lampist. The *moderator* lamp is less complicated, and was invented to obviate the difficulties just mentioned. In this lamp the oil is forced up from a cylindrical reservoir below by the descent of a loaded piston, and the supply to the burner, which would otherwise diminish as the weight of oil, added to that of the piston, becomes less, is regulated by increasing the size of an opening in withdrawing from it a wire slightly tapering. This apparatus, however, is liable to irregularity on account of derangement of the supplying apparatus, the varying friction of the packing of the piston, as well as the change in the flow of the quantity of oil, owing to its less liquidity on account of a diminution of temperature. The improvement consists in substituting for these lamps one of constant level, invented by Mr. Joseph Funck, the foreman of the workshop at the light-house depot, Staten Island. In this lamp the reservoir containing the oil is placed above the burner, and the flow of oil necessary for perfect combustion regulated by a floating piston placed in an enlarged portion of the supply tube, and carrying on its upper surface a conical projection, which increases or diminishes the size of the supplying orifice in accordance with the rapidity of combustion. This lamp is not only free from the objections mentioned as pertaining to the other lamps, but is less expensive and better adapted to the burning of lard oil. It affords a freer combustion, and consequently a more intense light, though at the cost of a larger amount of the burning material. This is principally due to passing the heated air and products of combustion from the lamp through a cylindrical opening in the reservoir of the oil, forming, as it were, a prolongation of the chimney, and thus keeping the oil at a temperature which prevents freezing in the coldest weather, and supplies it to the burner in the best condition for combustion. Moreover, the lamp is so simple in its construction as to seldom need repair, and can be kept clean and in good condition by any keeper of ordinary intelligence. The superiority of this lamp has now been established by the trial of a number of years, there being at present in actual use 1 of the 1st order; 14 of the 3d order; 7 of the 3½ order.

They are much liked by the keepers, as they give less trouble in attendance, and it is the intention of the board to adopt them in all cases in which new apparatus is supplied to light-houses, or in which lamps of the old form are to be replaced.

Not only has a series of experiments been made on the different illuminating liquids, but also on light of different character, viz.: the electrical light, the oxy-hydrogen lime lights, and the magnesium lights. In order to study experimentally the peculiarities of the electric lights, one of the latest electro-magnetic machines, that invented by Mr. Wilde, of Liverpool, has been purchased. The committee on experiments have, however, found difficulty in procuring an engine with the requisite gearing to obtain the rotary motion of the armature necessary to produce the maximum effect of this machine. From the observations, however, which have been made in regard to it, it is, in its present form, not well adapted to light-house purposes. It requires a speed of 2,500 revolutions per minute to develop its maximum effect, but a velocity of revolution as great as

this must soon destroy the parts connected with the centres of motion, and require their frequent renewal. Besides this, the problem is not alone what machine of a given size will produce the greatest amount of electricity without regard to the powers expended, but that which will produce the greatest amount of electricity with a given expenditure of power. This problem, we think, has scarcely yet been solved.

Furthermore, from the investigations which have been made by the committee on experiments, it would appear that the penetrating power of light in absorbing media depends principally upon the number of rays which are emitted from a given luminous space; and hence, if the absorbing power of fog be similar to that of colored glass, with which the experiments have been made, the penetrating power of a beam of electric light may be equalled by one from the combustion of lard oil. This opinion is founded upon the fact that flame is transparent, and that the penetrating power of two separate flames is increased by bringing them together, as has been proved by experiments on lamps with concentric wicks.

Experiments have also been made upon the application of the oxy-hydrogen lime light, but the labor and danger connected with the production of the gases, the expensive apparatus, and the liability of the lime to become deranged, far outweigh any advantages in the way of superior illumination which can be derived from it.

The light from the combustion of magnesium has also been examined, and from the results it would appear that if this metal could be procured in sufficient quantities, and at a reasonable cost, it would probably supersede all other materials which have been proposed for light-house illumination. A flattened wire, weighing $3\frac{1}{2}$ grains to the foot, gave a light while burning in the air, without a lamp, equivalent to 206 candles. In the present state of supply of the substance, however, it is only applicable to a casual use by the photographer, or for illuminating during a brief period illustrations in the lecture room.

The subject of fog signals, as stated in previous reports, has received the special attention of the board. The sounding instruments which have been employed are bells, steam whistles, trumpets, sirenes, and in some instances cannon. The sound from a bell of ordinary size, viz., of 2,000 lbs., or under, has less penetrating power, or can be heard to a less distance than that from either of the other instruments above enumerated. It is, however, used in cases in which the danger to be signalized is at a small distance from the direct channel. For ringing the bell, an automatic apparatus, borrowed from the French system, was first employed. This was afterwards improved, and during the past year has received another modification which greatly diminishes the amount of muscular power expended in producing the desired effect. In the old form of the machine, the descent of the moving weight was regulated by a fly-wheel, which, being in constant revolution, expended a large portion of the motive power in giving velocity to the air. In the improved apparatus, the intervals of striking are governed by a pendulum and clock escapement, which is kept in motion by a small extra weight, and which, unlocking at a given moment a detent, allows the large weight, during a brief descent, to give motion to the hammer. By this arrangement, the same number of blows, of equal intensity, are struck in the descent through the same distance of a weight of one-fourth or one-fifth the magnitude of that used in the previous form of the machine.

The ordinary steam whistle on the eastern part of our coast is a favorite instrument, it having been successfully applied as a fog signal for a number of years at Partridge island, in New Brunswick. In proportion

to the power applied, the sound produced with this instrument, as measured by the distance at which it can be heard, is less than that from the trumpet or the sirene. The sound is given off in every direction, and therefore, as in the case of the light from an ordinary lamp, without reflectors or lenses, but a small portion of the sound is utilized for signaling in a given direction. If, however, the amount of steam expended is not taken into consideration, a sound sufficient for any purpose may be obtained. But the large amount of power required to produce a given effect is not the only objection to the general use of this instrument, since it also involves the employment of a steam boiler and other apparatus not entirely free from danger, on account of explosions, and necessitating the supply of fresh water in some places where this liquid is not readily obtainable. A fog signal of this kind has, however, been ordered for West Quoddy Head, near the extreme eastern portion of Maine.

The fog trumpet is an ordinary horn of large dimensions, in which the vibrations are produced by a steel tongue put in motion by a blast of air from a reservoir in which it is condensed by a hot-air engine. When the steel reed is properly attuned so as to vibrate in unison with the column of air contained in the trumpet, the sound produced is greater than that of any other instrument with the same expenditure of power, though the absolute quantity of sound obtained may perhaps be exceeded by other instruments.

The sirene, as is well known, consists of a revolving disk perforated with holes or openings, and made to revolve with great rapidity before the head of a drum of the same diameter, also perforated with the same number of holes, and terminating the pipe leading from a steam boiler. The currents of steam issuing from the holes in the end of the drum being suddenly stopped and again allowed to move, thus alternately give rise to a sound of which the pitch varies with the rapidity of motion of the revolving plate. This instrument, to which is also attached a large horn or trumpet, affords admirable facilities for determining the penetrating power of sounds of different pitch. The sound it produces in proportion to the power expended is intermediate to that produced by the steam whistle and the trumpet. In comparing the sound of a large horn in which the vibrations were produced by a sirene with that of another in which a similar office was performed by a steel tongue, the result was in favor of the sirene, though, after improving the unison of the steel tongue in the case of the horn, the effect of the latter was increased so as to be heard, under circumstances not the most favorable, from Sandy Hook to the light-house depot on Staten island, New-York, a distance of 15 miles. A final comparison was not made at the time on account of the accidental burning of the shanty erected for the protection of the sirene, and the consequent derangement of the instrument.

Investigations in reference to fog-signals, as well as the methods of illumination, are still in progress. They involve, however, no small degree of labor and of original thought. In case of the former it is necessary not only to ascertain the instrument best adapted for producing sound at different localities, but also the proper motive power to be employed.

These investigations will be very much facilitated by the laboratory, photometrical room and other accommodations for experimental purposes, now being provided in the new building at the light-house depot on Staten island.

The operations of the Light-house establishment since the last annual report, and the requirements of the next year, are presented in detail by districts, as follows:

FIRST DISTRICT.

The first light-house district extends from the northeastern boundary of the United States to Hampton harbor, New Hampshire. There are in this district—

Light-houses and lighted beacons.....	46
Light-vessels.....	None.
Beacons unlighted.....	41
Buoys actually in position.....	303
Spare buoys to supply losses.....	234
Tenders, (steam).....	1
Tenders, (sailing).....	None.

The following is a statement of operations, condition, and requirements:

1. *West Quoddy Head*.—A copper base for dome of ventilator; new cooking-stove and fixtures; new lantern stove, and call-bell for watch room, have been supplied. The illuminating apparatus has been examined and repaired where necessary. A cylindrical tank, 11 feet inside diameter and 8 feet 3 inches deep, with a well in the centre 4 feet in diameter and 3 feet 3 inches deep below the bottom of the tank, has been dug and walled. It is estimated that a supply of about 4,500 gallons will be obtained. The tower is reported to be leaky. The joints of the stone gallery around the parapet wall require raking out and thorough repointing with cement mortar. The tower wall, which is of brick, should be cement washed outside two coats, and the interior wall, iron stairs, window frames, and oil butts, repainted. A road from the westerly line of the government property at this place to the light-house, a distance of about three-fourths of a mile, would add much to the convenience of the station in transporting supplies. The fog-signal, a trumpet operated by a hot-air engine, established in 1866 at this station, having been found to be defective in power, the establishment of a steam apparatus designed to blow an 8-inch whistle in blasts of 10 seconds duration, with intervals of 50 seconds, is in progress. This whistle may be operated at a pressure of 100 pounds per square inch. The necessary supply pipe, &c., is now being laid. The present engine house and coal shed will be enlarged to suit the new machinery.

2. *Little river*.—The roof of the keeper's dwelling has been resingled; new saddleboards provided; zinc placed around four windows; cooking stove renovated; lantern stove and fixtures supplied; floors painted; revolving machinery and clock cleaned; burners resoldered; and new packing and valves put in house pump; new cellar door and window shutters provided; plank supports placed under cellar stairs, and new door at head of stairs; plastering of all rooms repaired; boat-house reboarded, renailed, and roof resingled.

3. *Libby island*.—Boat-slip repaired; new boat with sails, oars, &c., completely supplied; old boat repaired and sent to Franklin island light station; lantern stove and fixtures supplied; cooking stove refitted; floors and lantern outside painted; illuminating apparatus overhauled and new inside cover for lantern dome ventilator supplied. The fog-bell machinery, which had been broken by the blowing down of the bell tower last year, has been readjusted.

4. *Moosepeak*.—Revolving machinery cleaned; burners repacked; watch room call-bell and fixtures set; lantern door refitted; lightning conductor reset; cooking stove renovated.

5. *Nash's island*.—Cooking and lantern stoves refitted; floors painted; illuminating apparatus examined and adjusted.

6. *Narraguagus*.—Dwelling and wood-shed painted outside; cooking stove refitted; illuminating apparatus examined; burners and accessories repaired; cistern pump repaired.

7. *Petit Menan*.—Dwelling, wood-shed, and boat-house painted outside; plastering in three rooms repaired; doors refitted and floors patched; cooking and lantern stoves refitted; floors painted; 28 panes of glass set; illuminating apparatus examined; revolving machinery cleaned; burners, lamp-cover, and other accessories repaired; watch room call-bell and fixtures set; lantern painted inside. New hammer, screw-bolt, and springs for fog-bell machine supplied. The bell at this station having been cracked a new one has been provided. A new boat, with sails, oars, &c., complete, has been furnished.

8. *Winter harbor*.—Iron spindle for lantern dome ventilator; cast-iron smoke-pipe for lantern provided; cooking stove and fixtures supplied; inside wood-work of dwelling painted; illuminating apparatus examined. A new boat is required for this station, the one now in use being worn out and unworthy of repairs.

9. *Mount Desert*.—Inside wood-work of dwelling painted; 30 panes of glass set; two galvanized buckets for tower and coal shovel supplied; boat slips repaired, and doors of boat-house refitted; water-closets repaired; new boat and fixtures supplied.

10. *Baker's island*.—Dwelling painted outside; new door furnished to boat-house; cooking stove and fixtures supplied; ventilator for lantern and smoke-pipe provided; seven panes of glass set; inside wood-work of tower painted; two lens covers supplied; illuminating apparatus examined.

11. *Bear island*.—Roof of dwelling reshingled; valley releaded; chimneys and underpinning of dwelling and tower repointed with cement mortar; exterior wood-work of dwelling painted; cooking stove and fixtures supplied; illuminating apparatus examined and new tubes fitted in burners; glass set where required; new boat, with sails, oars, &c., complete, supplied.

12. *Bass Harbor Head*.—Dwelling painted outside; covering stone put on kitchen chimney; cistern pump and fixtures for cooking stove supplied; illuminating apparatus examined and burner retubed.

13. *Edgemoggin*.—Plastering in kitchen repaired; side of dwelling in wood-shed ceiled with plank; new door-latches fitted; back doorsteps rebuilt and windows reputtied; cooking stove fixtures; hinges, hooks and staples for boat-house doors; two conductor dippers and a 6-inch ventilator for lantern smoke-pipe supplied; new boat and accessories supplied.

14. *Saddleback Ledge*.—Wooden addition to tower painted outside; floors painted; 24 panes of glass set; lantern, stove fixtures, and 6-inch ventilator for tower supplied. A new boat, with masts, oars, &c., has been furnished.

15. *Heron Neck*.—Exterior and interior wood-work of dwelling painted; two doors for cellar bulkhead, with hinges and hooks provided; glass set where required; fixtures for cooking stove supplied; illuminating apparatus, burners and accessories repaired; new valves fitted in cistern pump and pipe soldered; timepiece cleaned; new boat and accessories supplied.

16. *Deer Island Thoroughfare*.—New privy built; stove fixtures and hardware supplied; illuminating apparatus examined. The boat at this station is old and worn out, and a new one, as well as a suitable boat-house, is required.

17. *Eagle Island Point*.—Stove fixtures supplied; illuminating apparatus examined, and burners retubed; boat repaired and new oars supplied.

18. *Pumpkin island*.—Wood-shed underpinned with stone, and floor partially renewed; old wooden cistern removed and a new one, also of wood, resting on stone piers, built in its place; water conductors repaired; floors and interior iron-work painted; cooking stove fixtures supplied, and 24 panes of glass set; illuminating apparatus examined and burners retubed; new boat and accessories furnished.

19. *Matinicus Rock*.—Door latches refitted; interior wood-work of dwellings repainted; 24 panes of glass set; a lantern, stove and fixtures, and 15 fathoms rope for fog-bell supplied; illuminating apparatus examined; watch room call-bell set; leak in lantern dome repaired; lanterns painted outside; pipe to pump repaired.

20. *White Head*.—Illuminating apparatus examined and repaired; new cistern pump provided; stove fixtures supplied; new boat and equipments furnished. A watch-room call-bell is required.

21. *Owl's Head*.—A frame wood-shed, 15 feet square in plan, has been built; plank steps at back door renewed, and storm house built over door; cooking stove, cistern pump, and copper ventilator for lantern dome supplied; illuminating apparatus examined; burners retubed, and timepiece cleaned.

22. *Brown's Head*.—Inside wood-work painted; roof of work room reshungled; fixtures for cooking stove; cast-iron stove-pipe for lantern supplied; glass set where required; illuminating apparatus examined.

23. *Negro island*.—Dwelling cleansed throughout; all broken glass reset, and sashes repainted two coats; outside wood-work painted, walls repointed, and leaks about window-frames and chimneys stopped; door latches repaired or renewed, as required; storm-houses constructed over back and front doors; kitchen floors relaid; walls and ceilings partially replastered; chimney flue repaired; new cast-iron sink, pump, and pipe put in, and inside wood-work painted two coats; three rooms and passage partially replastered, and walls repapered; three closets built; all inside wood-work of dwelling painted; tower porch whitewashed inside and furnished with a service closet; privy moved to the rear of the dwelling, and plank to it laid; new wood-shed, 10 x 14 in plan, built; boat-house reboarded and reshungled, and fitted with new sills, doors, and fastenings. The boat slip has been repaired with new timbers, rollers, and fastenings. The wharf has been repaired with new planking and cap sills, and a flight of plank steps supplied. Illuminating apparatus examined and repaired; timepiece cleaned.

24. *Grindel's Point*.—Lantern, stove and fixtures, and two lens covers supplied; illuminating apparatus examined and repaired.

25. *Dice's Head*.—Cooking stove fixtures; new step-ladder supplied; floors and tower stairs painted.

26. *Fort Point*.—New lantern, stove and fixtures; accessories for cooking stove; two lens covers supplied; lantern railing painted; glass set where required; illuminating apparatus examined.

27. *Tenant's Harbor*.—Cooking stove and accessories supplied; set of revolving trucks made and adjusted; revolving machinery cleaned and burners repaired.

28. *Marshall's Point*.—New cooking stove and accessories supplied; illuminating apparatus examined.

29. *Manheigin island*.—Wooden dwelling painted outside, roof of dwelling, work room and covered walk to tower reshungled, walls of dwelling repointed, glass set where required, floors painted, cistern pump and fixtures for cooking and lantern stoves supplied; wood-shed floor partially renewed; rooms partially replastered; new cooking stove provided. The fog bell keeper's dwelling has been repainted outside, bell tongue rehung,

split keys, washers, and 8 fathoms of rope supplied, revolving machinery cleaned, lamps repaired, new set of jack-screws for lens made; top of bell tower resheathed and painted, deck sheathed and painted and water conductors supplied, new doors and steps made; privy repaired; new sill put under cellar floor.

30. *Franklin island*.—Cooking stove fixtures, new clock cord, dripping butt, cast-iron smoke pipe, spikes for boat slip supplied, glass set where required, illuminating apparatus examined and repaired.

31. *Pemaquid Point*.—Illuminating apparatus examined and repaired, 42 feet man rope and stove fixtures supplied, glass set where required.

32. *Burnt island*.—New pumps furnished, fixtures for lantern stoves and plank for cellar floor supplied; illuminating apparatus examined and repaired.

33. *Hendrick's Head*.—New cooking stove and accessories and two lens covers supplied; floors painted, glass set where required; illuminating apparatus examined and revolving machinery cleaned; new sails and painter for boat supplied. The exterior wood-work of the dwelling requires repainting.

34. *Pond island*.—New pump furnished, floors and tower stairs painted; illuminating apparatus examined and repaired. The cistern in cellar of dwelling leaks and requires re-cementing.

35. *Sequin*.—The exterior and interior woodwork of dwelling, interior of tower, iron stairs, watch room deck, exterior of lantern, balustrades, &c., have been thoroughly repainted; paint closet built in cellar, two storm-house doors furnished, two pumps and 16 feet of lead pipe, tool chest and full set of tools, fixtures for cooking and lantern stoves, a 35-foot ladder supplied, glass set where required; illuminating apparatus examined and adjusted, watch room call bell set, burners and lamps repaired; cover made for fog bell machinery. The boat has been thoroughly repaired and new oars supplied.

Halfway Rock.—An estimate of appropriation required to mark with a light-house this dangerous rock was submitted to Congress at its last session, but no appropriation having been made, the estimate is again submitted, a larger amount than was at first estimated having been found necessary. The corresponding increase has been provided for.

36. *Cape Elizabeth*.—The towers have been repointed with cement mortar and red stripes recolored, covered walks clapboarded, and two wood-sheds 10 by 14 feet built; an oven stove and a cooking stove have been supplied, revolving machinery cleaned, lens cowl repaired, watch-room call-bells set, new smoke stack for lamp made and adjusted, wick-holders and lamps repaired.

37. *Portland Head*.—Cooking stove fixtures provided, new spring for timepiece, two new weight-blocks and stud for fog bell machinery supplied; illuminating apparatus examined and watch room call bell set, tower whitewashed, dwelling and interior iron-work painted.

38. *Portland Breakwater*.—Cast-iron smoke-pipe for lantern supplied; illuminating apparatus examined, cowl repaired.

39. *Wood island*.—Boat house and slip 150 feet long built, illuminating apparatus examined, revolving machinery and timepiece cleaned, new boat and equipments supplied.

40. *Goat island*.—New cooking stove and fixtures supplied, interior of dwelling and tower painted and walls of one room papered, illuminating apparatus examined and repaired, new boat and equipments supplied.

41. *Boon island*.—Exterior and interior finish of dwelling painted, also floors and tower stairs; two new cooking stoves and fixtures, new lens cowl, new pump and rope for boat windlass supplied; glass set where

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required, boat-house renovated and boat slip partially repaired, illuminating apparatus examined, watch-room call-bell set, valves put in cistern pump; new boat and equipments supplied. The boat-slip requires additional string-pieces, straps and bolts.

42. *Whale's Back*.—The top of the pier has been repointed with cement mortar, and two of the iron straps rebolted, two 22-gallon water casks and fixtures for cooking stove supplied; a new boat and equipments and new fall for the same has been furnished. This tower is reported to leak badly.

43. *Portsmouth harbor*.—Enclosure fence and gate repaired, two rooms papered, pump spear and box, lantern stove and fixtures supplied.

44. *Isle of Shoals*.—Hinges, hooks, and staples for boat-house and walk doors and two lamp covers supplied, tower stairs painted; illuminating apparatus examined, revolving machinery cleaned, watch-room call-bell set; boat overhauled and repaired and new sails, oars, &c., supplied.

BEACONS UNLIGHTED.

Sharp's Rock, entrance to Saco river. This spindle, iron, was broken off some months since and a spar buoy has been placed temporarily to mark the danger. The necessary repairs to the spindle are in progress.

Trott's Rock, entrance to Portland harbor. The top of the shaft, iron, has been bent, but otherwise is in good condition.

Black Jack Rock, entrance to Kennebec river. During last winter this spindle was carried away by ice; will be renewed.

Lee's Rock, Kennebec river, carried away by ice on its breaking up last spring. The work of renewing and resetting this spindle is in progress.

Ram Island Ledge, carried away by ice; renewal and resetting in progress.

Carlton Ledge and Lime Rock, beacons finished and set.

Merrill's Ledge, Clough's Rock, beacons finished and set.

Outer Rock and Middle Ground Shoals, entrance Castine harbor. The monuments formerly marking these shoals were overthrown by the ice on its breaking up last spring. Inasmuch as spars will answer all the requirements of a commerce which has much diminished since the monuments were erected, it is not deemed advisable to rebuild these expensive structures.

Lower Middle Ground, Lubec Narrows. The wooden beacon which formerly marked this station was thrown down some years since, and its place has been supplied with a spar buoy.

The beacons in the district which have not been specially referred to in this report are in good condition.

BUOYS.

The following buoys have been placed to supply losses during the past year, viz: First class nun on South Breaker; first class can twice replaced on Broad Cove Rock, entrance to Portland harbor; second class can on Old Anthony or Vapor Rock; second class nun on Witch Rock, entrance to Portland harbor; third class nuns on Fort Point Reef, Bay Ledge and Bell Rock, and third class cans on Sheep Island bar, Upper Gangway Ledge, Muscle Ridge channel.

Spar buoys replaced as follows; Pond Island reef, Old Man, Green Island reef, Bunker's ledge, Seal ledge, Boon Island ledge, Old Prince ledge, Mark Island ledge, Heron Island ledge, Petit Menan bar, Prospect Harbor ledge, Seguin ledge, Halftide ledge, Green Island reef, Turnip

Island ledge, Mark I land ledge, Eastern and Western ledges, Catfish rock, Sharp's rocks, Danceberry ledge, Outer bar and Inner bar, Saco river, Negro Island ledge, Gangway ledge, Cow and Calf, Otter Rock shoal, and Middle Ground shoal, entrance to Castine harbor.

The following new buoys have been placed in Hurl Gate passage, from Kennebec to Sheepscot rivers: Approaches to Sheepscot river; entrance to Pemaquid new harbor; eastern end of Northeast ledge; Camden harbor; entrance to isle au Haut harbor; Half-tide ledge; Low-water rock in Sullivan's harbor; Petit Menan reef, approach to harbor of Narraguagus; Nova's rock, and Little ledge to mark deep water channel to Seguin passage; Pembroke river, from Eastport to Pembroke.

Care has been taken to provide and keep on hand a full supply of spare buoys and appendages, a precaution peculiarly important in this district, wherein occur such frequent losses of buoys and their moorings from ice.

TENDERS.

The steam tender *Iris* has been constantly employed in carrying supplies to the several light stations; transporting workmen and materials for repairs and renovations, and in raising, cleaning, painting, and replacing buoys, &c.

The boiler of this vessel being found to be defective and unworthy of further repairs, a new one has been contracted for, and will be completed and placed in the course of a few weeks.

DEPOTS.

The buoy depot of the district is located partly upon a ledge, and the depth of water close to is insufficient to allow the tender to lie alongside except at high water. The building is, moreover, objectionable from the fact that it extends beyond (about one-third its length) the limit of the ground at the disposal of the light-house establishment. It is recommended that the building be taken down and rebuilt with enlarged accommodations, and greater depth of water close to.

SECOND DISTRICT.

The second light-house district extends from Hampton harbor, New Hampshire, to include Gooseberry Point, Massachusetts. There are in this district—

Light-houses and lighted beacons.....	54
Light-vessels.....	9
Beacons unlighted.....	47
Buoys actually in position.....	468
Spare buoys to supply losses.....	578
Tenders, steam.....	1
Tenders, sailing.....	1

LIGHT-HOUSES, LIGHT-VESSELS, AND LIGHTED BEACONS.

45. *Newburyport harbor and beacon.*—New pipe and two boxes for cistern pump supplied; one room papered; kitchen chimney taken down to the roof and retopped; defective joints of two chimneys repointed with cement mortar, and tops painted two coats; large fireplace in kitchen bricked up, and hearth partially relaid; the privy, which had been blown down, has been righted and repaired. The inspector reports that in consequence of the great change of position of the bar at the entrance of this

harbor, these lights would be better guides to navigation if placed nearer to the northern extremity of the island.

46. *Ipswich harbor and beacon*.—Dwelling thoroughly repaired, with new windows, cistern, and well-pumps; stove fixtures, door latches, cellar case, shelving in cellar; exterior wood-work repainted; porch reshingled, and space enclosed from porch to privy; illuminating apparatus examined; revolving machinery cleaned; a set of new lens trucks of bronze supplied; burners repaired; new cooking-stove and accessories supplied. The plank walk leading from the dwelling to the range light, 989 feet in length, requires renewal.

47. *Annisquam*.—Two rooms and entry of dwelling papered; leaks around chimney stopped; shingling on roof of barn patched, and lamp-heater supplied; new gate at entrance to grounds built, and eight fathoms rope for well furnished; burner repaired.

48. *Straitsmouth*.—A brick cistern built in cellar of dwelling, and new pump and lead pipe furnished; 20 lineal feet of wood conductors put up; plastering of one room repaired; one chimney retopped, and interior of dwelling painted; lamp heater supplied; burners repaired; cooking and lantern stoves supplied. The east end of the dwelling leaks; attempts to find the leaks have been unsuccessfully made.

49. *Cape Ann*.—Boat-ways repaired; cistern of new dwelling enlarged; chimney retopped; ventilator reset; wood-shed enlarged, roof renewed, and sides shingled; ledge removed by blasting; old stone-house reshingled and walls repointed; stove fixtures, lamp covers, boat compass supplied, and boat repaired; the scow used for landing fog-signal engine has been redecked; cistern and oil-butt stands recovered with boards, and board partition built in attic of wooden dwelling for clothes press; illuminating apparatus examined; burners repaired; interior of both towers and exterior of wooden dwelling painted two coats; 37 sets window blinds and trimmings for both dwellings provided, painted, and hung; two new cistern pumps supplied; one room and two entries papered; the fog-signal engine has been repaired and repacked throughout, in April, July, and September.

50. *Eastern Point*.—Old porch removed, and new porch built; cistern ventilator and filtering box supplied; house roof partially reshingled and repaired; water conductors, threshold, and sill of outer door renewed; partition built in chamber for a clothes press; cistern pump renewed and cistern recemented; barn repaired with new sills, floor, and side boarding; exterior trimmings of dwelling repainted; also kitchen floor and bell tower; ventilator for kitchen chimney supplied; stove fixtures and chest of tools furnished; two rooms papered; illuminating apparatus examined and repaired. A new bell weighing about 1,120 pounds was provided with the proceeds of sale of the old bell and a condemned bell, which had long been in store in the first district. In February last a set of Stevens's improved striking apparatus, including weight, for the fog bell was erected, and the old machinery properly cared for. The cellar at this station is damp and requires attention. The top of bell tower leaks, and the covered walk will require repairs next season; a fence on the northerly line is needed.

51. *Ten-pound island*.—Boat-house and ways built; partition set under eaves of dwelling to make a clothes press; floors renailed and new trap-door for lantern man-hole supplied; boat-house painted; new oil-cloth for lantern deck, new boat and accessories, chest of tools, and stove fixtures supplied; timepiece repaired; chimney cleaned out and retopped; ventilator reset; stone wall around house and at junction of storm-house and tower repointed; ceiling of rear entry replastered; illuminating apparatus examined and burners repaired.

52. *Baker's island*.—Bell tower and lanterns of both towers painted; new window frames; packed with paint cement, set in eastern tower; lantern and cooking stoves refitted; illuminating apparatus examined and repaired; fog-bell machine repaired and adjusted; timepiece cleaned; new boat with sails, &c., complete, and chest of tools supplied.

53. *Marblehead*.—Kitchen hearth relaid in concrete on stone foundation; ceiling of one room replastered; glass set where required; sashes reputtied and painted; shed door repaired; boat-house repaired with new sills, floor, saddle-boards, and roof resingled; outside trimmings of dwelling repainted; illuminating apparatus examined; burners repaired; timepiece cleaned and oiled; new ensign and halyards for boat; chest of tools supplied; the covered walk to the tower is reported to be leaky and requires resingling.

54. *Egg Rock*.—New floor laid in wood-shed and roof repaired; junction of tower and roof releaded; weather strips fitted to doors and iron plates to sills; frame of one door repaired and latch fitted; tin water conductors supplied; boat repaired; illuminating apparatus examined, repaired, and adjusted.

55. *Minot's ledge*.—Entrance ladder repaired; stove fixtures supplied; also ensign and halyards, hand lamps for watch-room, new boat moorings, and boats repaired.

56. *Boston*.—A plank platform, 40 feet long by four feet wide, has been built from the kitchen door to the wood-shed, with a close board fence instead of hand-rail; new cistern pipe fitted; new folding outside cellar doors made; glass set where required; wood-shed resingled and weatherboarding partially renewed; part of bank wall near tower relaid in cement mortar; two new sink drains, each 20 feet long, laid, and a well cover of joist and plank made. Boat-house repaired with new cleat door and two-hinge pintles, and useless door boarded up; double doors restripped and hinges refastened. A new sill has been put in coal-shed and one end of shed reboarded. The inner side of the south pier has been replanked vertically on an area of 36 feet by eight feet, and the tops of the same repaired by renewal of defective plank. The inshore corner has been refilled with 15 hundred weight of stone, and broken planking renewed. The outer side of the north pier has been repaired with 160 superficial feet of planking and 35 cubic yards of stone filling, the caps having previously been studded up with posts and stone blocking, and 152 tons of heavy stones have been placed outside a distance of 60 feet in length, and extending from the planking about four feet.

The sloop *Billow*, in delivering this stone, was caught between the piers—the passage in and out having been safely made in a previous trip—was left by the tide and fell about eight feet, having 80 tons of stone on board. She was damaged beyond the possibility of extrication in a whole condition, and was stripped and abandoned by her owners. As she laid at the entrance of the only landing at the station her immediate removal was a necessity, and a contract was therefore made to cut off her bow, fill both parts with casks and tow her to Quincy, where she was sold at auction. Four fender piles split by the sloop have been renewed and securely fastened.

The brick lining of the tower has been pointed, also stairs and watch-room walls; two storm windows for dwelling built; glass set where required; call-bell fixtures, stove fixtures, lamp smoke-stack for watch-room, and iron pipe to lead from smoke-stack to lantern ventilator, also damper for the same supplied; illuminating apparatus examined; revolving machinery cleaned and oiled; fan regulator and rod lamp repaired; new oars and boat moorings supplied and boat repaired; tool chest furnished.

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57. *Narrows*.—Ice-breaker painted; flight of wooden landing steps renewed; galvanized ventilators on two chimneys having rusted out, were removed at the roof and chimneys retopped with brick, with an arch turned on each and painted; illuminating apparatus examined, repaired, and adjusted; new stove fixtures, oars, boat-falls and moorings, and chest of tools, supplied.

58. *Long Island Head*.—One side of roof of dwelling addition reshingled; door latch renewed; service closet built and privy rebuilt; roof of boat house reshingled and plank walk repaired; exterior of tower repainted; globe ventilator set; plank walk to boat house rebuilt a distance of 35 feet; new sill put in boat house platform; illuminating apparatus examined and repaired; new burner and lamp heater, stove fixtures, supplied.

60. *Plymouth*.—Illuminating apparatus examined and repaired.

The exterior and interior of the dwelling and 18 pairs of blinds require repainting and blinds to be repaired. New flight of steps to outside entrance of cellar required.

61. *Race Point*.—Cistern pump, cooking stove and appendages, chest of tools and hand lantern for use at fog bell supplied; illuminating apparatus examined and timepiece cleaned.

62. *Long Point*.—Roof of dwelling patched and railed, and all leaks stopped. New stove and cistern pump required.

63. *Mayo's Beach*.—Leak in tower stopped with paint cement; tower and exterior trimmings of dwelling repainted; glass set where required; illuminating apparatus examined and adjusted; burners repaired; cooking stove and chest of tools supplied.

64. *Billingsgate*.—Plank platforms around the buildings renewed with joists and planks; walk from dwelling to landing relaid; arch turned over top of kitchen chimney; roof of shed patched; tower stairs, pedestal, &c., painted; stove fixtures, lamp heater, supplied.

65. *Sandy Neck*.—One room papered; new sail boat supplied; lamps repaired. Tin cowl required in lantern; also leaks in east gable of dwelling and around tower windows to be repaired.

66. *Cape Cod*.—Roof valley releaded and shingling railed; saddle-boards and window frames packed with paint cement; storm doors repaired; floor of covered walk repaired, and rebuilt 300 feet of enclosure fence; a plank sink drain and cesspool laid; one chimney arched in place of ventilator blown off; call bell fixtures set; tie rods fitted around parapet wall outside, the lower end of each having a cross head bolted to the gallery stone with wedge bolts, and the upper end going through the projecting iron deck of lantern with a nut turned on; three rooms papered; lantern glass set; tower stairs and decks painted; illuminating apparatus examined and lamps, &c., repaired; rope for white-washing tackle, wick rings, stove fixtures supplied, and oil butts repaired.

67. *Nausett*.—Ten new window frames provided and set; chimney pieces in two rooms repaired; glass set where required; old windows repaired; new sink drain of plank laid and plank cesspool built; new sill put in end of barn and boarding and battening repaired; top of one chimney from which ventilator had been blown, built up with brick three feet, braced to roof with four iron braces, and arch of galvanized iron put on top; partition of matched boards, with door built in assistant's room and painted; windows and frames painted, three coats; lock fitted to tower door; lamp repaired; oil carrier and chest of tools supplied.

68. *Chatham*.—Defective plastering of tower walls renewed; two chimneys of dwelling rebuilt from the roof; repointed one chimney top and cement-washed the cistern; roofs of dwelling reshingled and patched; front door cased and door blind hung; new gutters set; exterior trim-

mings and chimneys painted; covered walk and fences repaired; arch turned on kitchen chimney; two new windows and frames in tower made, set and painted; new frame made for cellar door and painted; one room papered; illuminating apparatus examined and repaired; timepiece cleaned and oiled; two lucernes, two lamp heaters, new oil cloth, new cooking stove and fixtures supplied.

69. *Pollock Rip light-vessel No. 2.*—This vessel was run into by the steamer Neptune on the 21st December, 1867, and very badly damaged. She was taken to New Bedford and thoroughly repaired at an expense of \$5,000, and returned to her station March 9; the Relief occupying the station during her absence. The papers have been placed in the hands of the United States district attorney to commence suit against the owners of the Neptune. Whilst in New Bedford for repairs, the lantern was taken off and thoroughly overhauled and repaired; reflectors cleaned and polished, new rack socket supplied; glass set, top puttied and ventilator repaired, apparatus generally repaired.

70. *Monomoy Point.*—Wash boiler set in cellar of dwelling; brick oven repaired and oven door and cellar window supplied; iron sink set in kitchen and lead spout connected; new window and frame; a painter for boat supplied; illuminating apparatus examined and repaired.

71. *Shovelful Shoal light-vessel No. 3.*—This vessel was taken to New Bedford in August, 1868, and supplied with a new hawse pipe; 30 fathoms new chain cable; belfry; windlass purchase, tiller, try-sail mast, outer jib; plate glass for lantern; paint and oil for painting; lantern house repaired; deck under lantern house calked and sheathed; 30 sheets new metal put on bottom; illuminating apparatus repaired.

72. *Handkerchief light-vessel No. 4.*—This vessel was taken to Hyannis in July, 1868, and 12 feet of false stem put in; metal on bottom repaired; new chock for step of lantern mast; extra purchase for windlass; some new rigging; new bedding; new foresail and jib and lightning conductor supplied; bell recast and old sails repaired; illuminating apparatus examined, and spare lamps and accessories supplied.

73. *Nantucket (Great Point).*—One chimney rebuilt above the roof and braced, one repointed and one cleaned and retopped and ventilator reset; ceiling of portico plastered; window frames packed; roof patched and railed; top of cistern repaired and cover made; sink drain relaid and barn repaired; new cooking and lantern stoves supplied.

74. *Sankaty Head.*—Iron sink, cistern pump and lead pipe supplied; lantern dome ventilator renewed; illuminating apparatus examined and repaired.

75. *Nantucket new south shoals light-vessel No. 1.*—Spare anchor; try and square sails; spare chain; leather hose; set of scales; new bedding supplied; old sails repaired; lamps cleansed; new burners fitted; two burners repaired, and 10 wick racks resoldered.

76. *Gay Head.*—Lantern and tower stairs painted; parapet doors repaired; barn repaired; illuminating apparatus examined; revolving machinery cleaned; lamps centred and levelled; burners repaired, and tinware resoldered.

77 and 78. *Brant Point and Beacon.*—All plank platforms and walks around the premises renewed; privy braced with joists; enclosure fence repaired; new pump, 5 panes lantern glass, new sail boat, and chest of tools supplied; illuminating apparatus examined; timepiece cleaned and oiled; lamps repaired. The dwelling and tower are leaky and require repairs. The range light requires new posts, repairs to boarding around the eaves and covering inside overhead.

79. *Nantucket Cliff Beacons.*—Plank walks renewed; illuminating ap-

paratus examined and adjusted; timepiece oiled and cleansed; lamps repaired; two lamps refitted with new burners; chest of tools supplied.

80. *Bass River*.—Illuminating apparatus examined; timepiece oiled and cleaned; burners repaired; chest of tools supplied.

81. *Bishop and Clerks*.—New boat fender built and fitted; protecting stones around the tower pier replaced, laid in cement mortar and tied together with iron dogs and backed with heavy stones laid in cement; iron entrance ladder to tower provided and door set at foot of lower stairway of tower; glass set where required; illuminating apparatus examined; revolving machinery cleaned; burner repaired; lamp heater and tools supplied.

82. *Hyannis*.—New box and spear furnished for yard pump; new box for cistern pump; bolt for door, canvass cover for folding doors of cellar, and chest of tools supplied; enclosure fence repaired; illuminating apparatus examined and burners repaired.

83. *Cross Rip light-vessel No. 5*.—This vessel was taken to Hyannis in July and the metal on bottom repaired; part of deck calked; tin and crockery ware and cordage supplied; boat repaired.

84. *Cape Poge*.—Chimney ventilator set; chest of tools supplied; burners repaired. The inspector reports that the bluff upon which this light is situated is rapidly wearing away and the light will soon require removal further inland.

85. *Succonneset Shoal light-vessel No. 6*.—New bedding, new awning, and boat sails, tin and crockery ware supplied; two panes of glass set in lantern; lamps repaired; pumps and davits repaired and bulwarks partially replanked. A set of new lamps (8) is required.

86. *Edgartown*.—Roof of dwelling, tower, wall, and corner boards railed and leaks stopped; two rooms and entry repapered; storm house and store shed built; sink, gate, and planking of bridge repaired; illuminating apparatus examined; timepiece oiled and cleaned, lamps and burners repaired.

The two large wooden cisterns in dwelling require to be taken down and the stone foundation repaired. About 30 feet in length of the stone protecting wall of the causeway leading to the light-house, at a point on the seaward side where the northeast winds and tide strike, have settled so that they afford no protection from the sea, and require to be replaced. It is believed that there is a sufficient quantity of stone lying at the inshore end of the causeway. These renovations have been ordered.

87. *Holmes's Hole, West Chop*.—Illuminating apparatus examined, burners and tin-ware repaired. An iron sink in place of the wooden one, nearly worn out, is required; also three new doors and repair of three others; roof of dwelling needs patching; new privy and one pane of lantern glass required.

88. *Nobsque Point*.—Corner boards of tower packed with paint cement; walls of dwelling repointed; plastering renovated; cistern recemented; nailed studding in one room and reset base boards; sink built in kitchen; one window renewed, all others repaired and blinds repainted; new weather boards on east end of tower fitted; wooden addition and exterior trimmings repainted, two coats; new yard gate set; illuminating apparatus examined and repaired.

89. *Tarpaulin cove*.—Wooden addition, 9 by 15, to dwelling built; new plank platform laid; privy repaired and reshingled on two sides; boat-house roof patched and railed, and doors refitted; eaves of dwelling reshingled; two doors refitted and window sash and cellar case repaired; blinds and exterior trimmings painted; illuminating apparatus examined and repaired; timepiece cleaned and oiled; oil butts and boat moorings supplied.

The boat-house is very much out of repair, and it is proposed to build a new one next year. A covered walk from the tower to the dwelling is also needed.

90. *Vineyard Sound light-vessel No. 7.*—New bedding, hoods for hatches, new boat sails, blocks, metal on bows, supplied; bulwarks repaired; lamps refitted and repaired.

91. *Hen and Chickens light-vessel No. 8.*—This vessel was taken to New Bedford, decks resheathed and other necessary repairs made; caboose, deck light for cabin, new windlass purchase, new boat, new trysail mast, signal lantern, stove fixtures, blocks, &c., supplied; illuminating apparatus examined and lantern glass set.

92. *Cuttyhunk.*—Illuminating apparatus examined and repaired.

93. *Dumpling Rock.*—Lower end of boat-slip refastened; new boat-house built, sides and roof boarded and shingled, and painted, two coats; double-board floor, and attic single-board; four windows, double doors in one end and single door in side, tongued and grooved; sills bolted to rock. Platform renewed, 40 feet in length 9 feet 6 inches wide, and 60 feet in length 5 feet wide, of 2-inch plank, on sills 6 by 6 bolted to the rock; roof of shed reshingled on tarred paper; new floor laid in one room; pawl to crane repaired; sliding strips to shed door renewed; tower and all exterior trimmings of dwelling painted one coat, new storm blinds three coats; one skid in boat-slip renewed; walls repapered; illuminating apparatus examined and burners repaired; new blocks for boat-falls, new sail-boat and accessories, supplied.

94. *Clark's Point.*—Illuminating apparatus examined and burner repaired; stove fixtures supplied. This light-house is about one-fourth mile from the dwelling and stands directly under a face of the fort which is building, and in the certainty of its proposed speedy discontinuance in that site, has not received the attention in the way of repairs which it requires. Steps are in progress for its removal to a position upon the fortification works.

95. *Palmer's island.*—Illuminating apparatus examined, lamps repaired and brackets provided; new boat moorings supplied and boat repaired. Interior of dwelling requires painting.

96. *Ned's Point.*—A section of the stone wall protecting this site has been entirely relaid a distance of 37 feet in length, 7 feet high, and 3 feet wide, and well backed with stone; the top of the wall, for an additional length of 123 feet, has been relaid; new porch built against south side of dwelling, enclosing yard pump; leaks in dwelling stopped with paint cement; pump boxes releathered; new platform of plank built over well; new floor timbers set in one side of dwelling, beam 8 by 8 inches, with brick pier under centre; other timbers 3 by 8 inches and 3 by 9 inches, and three new sills 3 by 8 inches alongside of old sills in the other side of the dwelling. An outside entrance to cellar has been built, 3 feet 8 inches wide, with seven stone steps, with an outside shed covering opening from covered walk. The large chimney in the kitchen, including a brick oven and large fireplace, taken down and rebuilt, and galvanized iron ventilator from old chimney reduced in size at base and reset; the sink, which interfered with a window, removed to side with the chimney; closet set and shelved; ceiling and walls of kitchen replastered; new stove-pipe thimble and pine mantel shelf set; pantry built, shelved, lathed and plastered; closet provided; door-way from pantry to east front room made; in east front room, floor taken up, timbers renewed, and floor replaced, base boards partly renewed, plastering renewed, mantel shelf removed and reset on iron brackets, closet built under stairs, room papered and painted; dormer window built; inside of curbing floored with brick

from chimney. Unfinished entry at head of stairs lathed and plastered; scuttle window set in roof of kitchen; east roof of dwelling reshingled; 10 pairs of blinds and outside front door repainted one coat, and exterior trimmings and new work of interior two coats; two new doors and trimmings furnished; illuminating apparatus examined and repaired.

97. *Bird island*.—Tower parapet sheathed outside with matched pine boards, joints packed with white lead and painted two coats; sea-wall rebuilt for a length of 220 feet from the bottom average 7 feet high, 4 feet thick, and well backed; boat-ways repaired with seven new rollers; distance between landing piers increased; boat cradle fitted to receive new boat; boat-house and well-curb painted; new hook for head of boat cradle, new stove fixtures, new sail-boat and accessories, supplied; illuminating apparatus examined; revolving machinery and timepiece cleaned.

The work of relaying the sea-wall, refastening sections of landing piers, building close board fence, and painting the dwelling, is in progress.

98. *Wing's Neck*.—Roof valleys reshingled; gutters worked down at ends and all leaks stopped with paint cement; three chimney tops repointed and chimneys painted two coats; repainted two rooms, exterior trimmings, tower (on roof of dwelling,) cellar doors, and well-curb; three rooms repapered; inside cellar door rehung; one pane of glass set in lantern.

Relief light-vessel No. 9.—New windlass purchased; four panes of glass for lantern supplied; sails, blocks, pump, and decks repaired.

This vessel has been kept in readiness to occupy a station at any moment when the withdrawal of a light-vessel for repairs was necessary, or when the light-vessel had been driven from her station by any casualty.

The inspector reports that the light-vessels have all been put in excellent condition and all necessary articles supplied. Two spare bells have been cast, and are kept in readiness to be hung in case of accident to those now in use.

UNLIGHTED BEACONS.

Spindle Rock.—The small iron spindle which marked this rock was carried away by ice and has been replaced.

Bird island.—This stone beacon, which had capsized, was righted up and filled around with 40 tons of riprap stone.

Sunken island.—The spar and cage which had been carried away have been reset.

Half-tide Rock.—This beacon, stone with a wooden spindle, was carried away by the sea. Its renewal is now in progress.

Little Aquavitæ.—This wooden spindle was carried away by the sea last spring. It has been renewed and replaced.

Hardy's Rock.—The spar which had been carried away by the sea has been renewed and replaced and supported by four iron rod braces one inch diameter.

Bowditch beacon.—Several supporting stones near the base of this spindle have been knocked out of position and the spindle is out of plumb. No present repair is contemplated.

Halfway Rock.—This beacon was demolished several years ago, and as it stood upon a rock large and high enough to afford a sufficiently prominent mark, no attempt has been made to rebuild it.

Ram's Horn.—The top of the beacon, which had been carried away by ice, has been relaid and mast and day-mark renewed.

The beacons in this district not herein specifically referred to are in good condition.

BUOYS.

In this district during the past year, 103 buoys have been carried away or moved from their true positions. About one-third of this number have been recovered and replaced, and the deficiency made up from spare buoys on hand. Only five buoys are now known to be out of positions, and these the tenders are now engaged in replacing. All the other buoys have been shifted and painted; moorings examined.

The bell-boat off Harding's ledge has been taken ashore, her bottom cleaned and painted, and her moorings put in good order.

A spar buoy has been placed to mark a detached rock south of the extremity of East Chop Holmes's Hole, and a similar buoy placed to mark another rock at the entrance to Edgartown harbor.

Of the spare nun and can buoys on hand, 123 are new buoys of original faulty construction, which after alteration and strengthening are still found unreliable. Several have been again altered by repacking the tompons with vulcanized rubber, and some of them have been for some time in use and appear to stand well. Sixty new stone sinkers have been contracted for, to be delivered at Gulf island in October, ironed ready for use.

Some additional new spar buoys will soon be required. A large part of the old spar buoys reported on hand are at Wood's Hole, and are duplicates of those in position. A considerable number, the tops of which have been broken off, can be redressed and fitted for short buoys at small expense.

TENDERS.

The buoy tender Wave (schooner,) employed in the northern part of the district, was carefully examined and an estimate of required repairs submitted. After the commencement of these repairs, the vessel was found to be much more decayed than was anticipated. She had to be nearly entirely new topped as well as partially new planked below the water line, and new caulked and metalled throughout. This vessel is now as well adapted to the service as a sailing vessel can be, and is believed to be stronger and more efficient than ever before.

The steam-tender Cactus having been constantly employed during the winter in attending upon the light-vessels and buoys in the southern part of the district, authority was given to have her taken upon the railway and her planking and metal, which had been considerably injured by ice, repaired. Before, however, there was an opportunity to attend to these repairs, the vessel took fire, (probably from the hair-felt about the head of the boiler,) and was only preserved from total destruction by the energy and presence of mind of her master. The damages, with the other repairs authorized, were promptly attended to; the boiler protected from a like occurrence by being covered with galvanized sheet iron, and an iron bulkhead substituted for one of wood near the forward end of the boiler. The vessel is now in excellent condition.

The supply vessel Guthrie was reported by her master, on his return from his summer cruise of 1867, as giving unmistakable signs of weakness. A survey was held upon her and she was found to be in need of very extensive repairs. The vessel was put in the hands of ship-builders for repairs under contract, and she has been put in a condition of complete efficiency.

During the progress of these repairs the schooners J. Bender, jr., and Mary Willey were chartered temporarily to perform the duties belonging to the Guthrie.

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The repairs to the supply vessel *Pharos*, which were in progress at the date of the last annual report, were duly completed, and this vessel has been regularly engaged in carrying supplies to light-stations.

DEPÔTS.

The buoy depot at Gulf island, where the buoys and appurtenances are kept for the part of the district north of Cape Cod, is in good order, except that some of the sheds for storing articles are in need of slight repairs.

During the past year a valid title to the buoy depot at Wood's Hole having been obtained, plans and specifications have been prepared for increasing the wharf facilities; enlarging the area devoted to storage of buoys and appurtenances; removal of present buildings to more convenient sites, and erection of coal-sheds and water tanks; also, a building to contain blacksmith's shops, cooperage, paint room, and office.

It is proposed to obtain the requisite earth-filling by dredging the channel across the bar at the entrance to the harbor, so as to insure the passage of the relief light-vessel which it is designed to station at this place instead of in Great Harbor, as heretofore.

THIRD DISTRICT.

The third district embraces all aids to navigation from Gooseberry Point, Massachusetts, to include Squam Inlet, New Jersey, as well as Lake Champlain and Hudson river. There are in the third district—

Light-houses and lighted beacons.....	94
Light-vessels, (one being a relief)	8
Beacons, (unlighted).....	40
Buoys actually in position.....	340
Spare buoys, to supply losses.....	379
Tenders, (steam)	1
Tenders, (sailing)	1

The operations in the district, as reported for the present year, and as proposed for the coming year, are as follows:

99. *Brenton's Reef light-vessel No. 11.*—A new lantern and repairs to another have been authorized, and the requisite materials have been provided; but owing to the absence of suitable mechanics the work has been delayed. Repairs to boats, caboose, &c., have been made during the year.

100. *Beaver Tail light-house.*—The present condition of this station is not very good. The tower leaks and is quite damp. The paint on the iron-work, stairs, &c., is worn off.

It is proposed to cover the brick-work inside the tower with several coats of cement wash; to repoint the granite work, and repaint the iron-work; also, to repaint the wood-work of the keeper's dwelling, and raise the floor of the cellar.

The fog-signal is a Daboll horn, operated by an Ericsson hot-air engine. It has recently been repaired; but the keeper reports difficulty in getting heat sufficient to start it in less than thirty minutes after lighting the fire, and that even sixty minutes are required when the weather is very cold. It may be necessary to substitute some other engine before the difficulty is entirely removed.

101. *Lime Rock light-house.*—This station is in good condition, with the exception of the cellar walls. The leaks in the floor, as proposed in

the last annual report, having been stopped by concrete, the water sometimes forces its way through the cellar walls. The walls, which are of brick, are not sufficient to resist the pressure of the water coming from the seams and cracks in the rock out of which the cellar is cut. It is proposed to line the sides with a brick wall, of four inches thick, leaving a space of three-quarters of an inch between it and the old wall, and then fill up this space with asphaltum.

102. *Newport harbor*.—The old building has been removed. It is proposed to fill up the old cellar and level off the grounds.

Rose island.—By act of Congress approved July 20, 1868, the sum of \$7,500 was appropriated for the establishment of a light on the south end of this island. The work of constructing the requisite buildings will be commenced early in the ensuing spring.

103. *Dutch island*.—The wood-work requires painting, which will be attended to; otherwise this station is in good condition.

104. *Poplar Point*.—The keeper's dwelling is built of rubble masonry, one story high, with an attic. An octagonal tower of wood rises from the eastern gable, and is crowned by a lantern of old and discarded style, the deck and roof of which leak badly. The entrance to the tower is through a bedroom, of which it forms a part. It is not lined inside, and in winter freely admits cold and snow. No provision is made for keeping the stores and supplies. All the wood-work needs repainting, and the well requires a new chain.

The wall which was built along the greater portion of the water front is in a dilapidated condition, caused principally by frost. It has been in this condition for a number of years, and from observation it is evident that no serious damage will result if left in its present condition. As it would require a considerable amount of money to rebuild the wall, it is recommended that it be not done at present.

It is proposed to replace the present lantern by a new one of the beacon pattern, with iron deck-plate; to separate the tower from the bedroom by a partition; to line the inside of the tower with ceiling boards, and to provide closets and shelves for properly keeping the stores and supplies; to light and ventilate the bedroom thus separated by a dormer window; to repaint the wood-work, and to provide a new chain for the well.

105. *Prudence island*.—The dwelling requires repairs and thorough repainting, both inside and out. A suitable room should be arranged, with closets, shelves and hooks, for proper keeping of the stores, which are now unprovided for. A new stove and ladder are needed for the tower.

106. *Bristol ferry*.—This station consists of a square brick tower, attached to the keeper's dwelling. It is built without any furring or air-space, and is therefore damp. It is proposed to have those rooms in the tower which are used for store and watch rooms furred off and lined. A new ladder is also required.

107. *Warwick Neck*.—All the wood-work requires repainting, and the ceilings in several rooms need repairing; gates need renewing, and the out-buildings considerable repairs.

108. *Nayatt Point*.—The transfer of this light to Connimicut Point beacon having been authorized, the requisite preparations have been made and the transfer will take place on the 1st November, 1868. It is proposed to retain the dwelling for the use of the keeper of Connimicut Point beacon. A small boat landing will have to be built, and slight repairs to the dwelling will have to be made.

Connimicut beacon.—This was formerly an unlighted beacon, was built

of granite, and very substantial. An appropriation for the purpose having been made by Congress, it was prepared for the reception of a lantern and lens by increasing its height, and arranging the necessary watch and store rooms. The work is nearly completed, and the station will be lighted for the first time on the night of November 1, 1868, at which time the light at Nayatt Point will be discontinued, it being no longer required.

109. *Point Judith*.—The tower at this station is now being thoroughly repaired. The fog-signal, a trumpet operated by a Wilcox hot-air engine, is in good order, and according to the statement of the keeper can be sounded in from five to ten minutes after the fires are started.

110. *Block island*.—A new dwelling, with lantern attached, has been built on a more eligible site than that occupied by the old one, and on the night of the 15th September a light was for the first time exhibited from the new structure. Workmen are now engaged in taking down the old buildings, the materials of which will be used for the protection of the site against the destructive action of the wind.

111. *Watch Hill*.—The condition of this station remains as when last reported upon. The repairs and improvements then recommended have been delayed by other and more pressing requirements elsewhere.

112. *Moniak Point*.—The copper wire rope, which served as a lightning conductor on the tower, has again broken to pieces. The floor beams and floor of the dining room are badly decayed. It is proposed to provide a new lightning conductor, to renew the floor beams and floor, and to provide for ventilation under the same.

113. *Stonington*.—Is in good condition, and will not require anything in the way of repairs during the coming year.

114. *Eel grass shoal light-vessel No. 12*.—Repairs to caboose, &c., have been made, and new rope for boat's tackles has been furnished—all at small cost.

115. *Morgan's Point*.—An appropriation for repairs and renovations at this station having been made, the work has been so far advanced during the present season as to admit of the occupation of the new buildings. The old dwelling remains to be taken down, the cellar filled and the grounds graded. The wooden addition to the old dwelling will be removed to the southern boundary of the grounds and will be fitted up for a stable. The present outbuildings, which are in a dilapidated condition, will be removed, the stone fences repaired, and new gates provided.

116. *North Dumpling*.—By act of Congress approved July 20, 1868, the sum of \$10,000 was appropriated for repairs and renovations at this station, Watch Hill, and Saybrook. This amount, but little more than one-third the estimate submitted to Congress, is barely sufficient for the necessary repairs, &c., at the two stations last named. It is recommended to rebuild this station, and an estimate of the cost thereof is again submitted for consideration.

It is proposed to replace the apparatus for striking the fog-bell by a new one of improved plan. The old one, placed there many years ago, will only run four times as long as required to wind it up, and this has been made the ground of an application for the appointment of an assistant keeper. The new apparatus will run forty times as long as required to wind it up, and, it is hoped, will entirely do away with any necessity for an assistant keeper.

117. *New London*.—This station is in good condition. A few slates have been carried away by a recent gale, and will be replaced. The authorities of the city of New London were permitted to open a road

across the light-house grounds upon condition that they should keep it fenced. Heretofore they have failed to comply with the condition, but now promise to attend to the matter at once.

Race Rock.—The subject of the construction of a beacon to mark this danger has been under consideration by the board for some years, and by the act approved July 28, 1866, the sum of \$90,000 was appropriated by Congress for the purpose. Detailed plans for the construction of a tower of granite have been adopted by the board. It was proposed to lay the foundation upon the bed-rock, twelve feet below low water, by means of a coffer dam. This proposition was based upon soundings made at different times, which indicated that the area required for the proposed structure around the boulder known as Race Rock was very nearly flat, there being a slight inclination outwards from the boulder, this deviation from a horizontal plane not being at any point more than twelve inches. With difficulty these soundings were obtained, by means of an iron rod, from a vessel's boat, the current running at a very rapid rate.

In view of all the difficulties of the proposed construction, it was not deemed safe to rely upon the information gained in the foregoing manner, and a much more careful examination of the site was therefore made. An apparatus was contrived by means of which more reliable soundings could not only be made for the moment, but located and retaken if desired. The soundings could be, and were, referred to a bench mark, and were, therefore, independent of variations in the plane of either high or low water. This apparatus disclosed the fact that the former soundings were insufficient and unreliable for the purpose of a work requiring so much accuracy, and that the area required for the base of the proposed tower was made up of an aggregation of boulders of smaller size than Race Rock itself, and of such number and size as to make the use of a coffer dam impracticable. The project which contemplated the use of one has therefore been abandoned. New plans are now in course of preparation, and it is hoped that ere long something satisfactory may be designed, when the work will be immediately commenced.

118. *Bartlett's reef light vessel No. 13.*—The injuries which this vessel received by the ice during the past winter have been repaired, the decks and upper works have been calked, and boats repaired, the vessel having been taken to New London for the purpose, her place being supplied by the relief light vessel No. 17. A new riding-chain cable has been furnished, and the proper workmen are now engaged in putting the lamps in good order for the winter.

119. *Little Gull island.*—The works of repair and renovation at this station have been carried on during the past season, but have been limited by the appropriation heretofore available for the specific purpose. A wharf for the landing of building materials was constructed, a bell-frame, which stood upon the site selected for the new buildings, removed and prepared for the reception of a lens, from which to show the light during the course of the renovations, and the old tower taken down and the materials composing it prepared for use in rebuilding. In order to get a good foundation for the new tower, it was found necessary to extend the excavation to a depth of 19 feet below the coping of the protecting pier.

These preliminary works, together with the lack of room for the employment of more than a small force of workmen, and the exposed position of the station; which renders the landing of materials difficult, have tended to protract operations, and it will require the greater part, if not all, of next season to complete the work.

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An estimate of the amount necessary to complete the work is submitted.

120. *Gardiner's island*.—This station is in good condition, and requires nothing at present.

121. *Plum island*.—Both the tower and keeper's dwelling are in bad condition and should be rebuilt. The tower, built in 1827, leaks badly; the masonry is soft and crumbling; the lantern is of the old pattern and with small lights and large astragals, and it leaks badly. It is thought that the old buildings are not worth the money which would be required to put them in good order, and it is therefore proposed to rebuild them. An estimate of the amount which will be required to do this is herewith submitted.

122. *Cedar island*.—The rebuilding of this station, as authorized by act of Congress approved March 2, 1867, is now in progress and will be completed before the close of the season.

123. *Saybrook*.—By act of Congress approved July 20, 1868, means are provided for making the repairs and renovations required at this station. They will consist of an iron deck plate for the lantern; brick lining to the tower; iron stairway; suitable storerooms; rebuilding the foundation walls of the north and west sides of the platform on which the buildings stand; a coal and wood-house and other outbuildings; and will soon be taken in hand.

124. *Calves island*.—Nothing required.

125. *Brockway's Reach*.—It is proposed to rebuild the protecting pier at this station before the close of the present season, the requisite funds being now available.

126. *Devil's Wharf*.—Nothing required.

127. *Cornfield Point light vessel No. 14*.—The injuries caused by running ice have been repaired; a new boat, new jib, and new bell have been furnished. This vessel broke from her moorings on the 18th of March; was discovered adrift and a tug sent to her assistance from New London, which towed her to that place. On the 20th she was returned to her station, anchored with a single anchor, and remained until June, when she was taken to New London for repairs. The moorings which had been lost in March were recovered, and after the completion of the repairs to the vessel and her return to the station, were again used in mooring her.

128. *Horton's Point*.—This station is in bad condition. The lantern deck (of stone) leaks badly and the water filters through the wall at the base, making the rooms for the storage of oil and other supplies very damp. The roof of the dwelling leaks and the walls and floors need repairs, and all the woodwork requires painting. It is proposed to cover the stone deck of the tower with a cast-iron deck plate; to repair the roof; to provide a proper storeroom, by enclosing a portion of the passage-way from the dwelling to the tower; to repair the barn and fences, and to repaint all the woodwork. The necessary estimates are submitted.

129. *Faulkner's island*.—Since the last annual report, the repairs then proposed have been made.

The tower at this station is built of cut sandstone with rough stone backing, all laid in lime mortar. It is octagonal in plan, and on the west side has four windows with wooden frames and sashes. The stairway and landings are of wood and are decaying. The tower leaks in many places and requires repointing. The lantern and lantern deck are of iron and in good condition.

The dwelling is built of wood, is one and half stories high, with a kitchen attached. The kitchen is connected with the tower by a covered

passage-way. Under the south room of the dwelling there is a cellar, walled with brick, which has an entrance from the outside of the dwelling. The dwelling has, besides the kitchen, dining room, and sitting room, three bedrooms, that over the kitchen having an entrance door of only four feet in height. Since an assistant keeper has been appointed to this station the dwelling is too small for the accommodation of both. The roof of the dwelling is of shingles, nailed to strips two inches wide, and from five to six inches apart. During the winter large quantities of snow drive in, injuring the ceilings, floors, and the health of the occupants. The barn and boat house are in a dilapidated condition.

It is proposed to substitute iron stairs, landings, and windows for those of wood in the tower; to raise the roof of the main part of the dwelling so as to admit another story of two rooms; to reshingle the roof over matched boards and tarred paper; to provide an inside entrance to the cellar, and a storeroom for the supplies, &c., for the tower, and to repair the barn and out-houses; and for these repairs and renovations the requisite estimate of the cost is submitted.

130. *New Haven*.—The tower requires new windows; in every other respect it is in good condition. The dwelling and kitchen, the adjoining sheds, and the oil vault, are unfavorably located, and not properly drained, in consequence of which the surface water accumulates there and causes the rotting of the floor beams and floors, besides dampness in the dwelling. At times the oil-vault has as much as eight inches of water on the floor. The cistern leaks. The stable and barn are in very bad condition, and the fence requires attention.

It is proposed to put new windows in the tower; to use a part of the passage-way, between the tower and house, for a storeroom; to lay suitable drains under the dwelling and adjoining buildings; to renew the floors and floor timbers; repair the plastering and repaint the wood-work; to repair the engine-house, rebuild the stable and barn, and thoroughly repair the fences. An estimate of the cost is submitted.

131. *New Haven, Long Wharf*.—Requires nothing.

132. *Stratford Point*.—This station is in bad condition. The tower is of wood, shingled outside, but without ceiling or lining inside; it is old, leaks badly, and is very frail; the lantern is too small; the dwelling is old, and repairs upon it are frequently required and made. It is not deemed good economy to expend any more money upon the old buildings, and after reference to the remarks concerning this station, in the annual report of last year, the recommendation therein made is renewed, as well as the estimate of the required appropriation.

133. *Stratford Shoals, light-vessel No. 15*.—A new boat and new hawse pipe have been furnished, and injuries to copper and hull by ice have been repaired, for which purpose the vessel was in June last taken to New Haven, taken out of the water and closely examined, after which she was returned to her station. She was driven from her station by ice three times during the past winter; once in February and twice in March. Upon the last occasion she dragged her anchors into deep water, where one of them became fouled in such a way that, with all the power and purchases which could be used, both on board the vessel and the tender, it was impossible to lift it. An attempt will be made to recover it, together with the 15 fathoms of chain cable attached to it, but if the attempt is not successful within a reasonable time, another anchor, with the needful length of cable, will be sent from the store on hand, and the vessel remoored, in preparation for the winter.

134. *Bridgeport Beacon*.—During last winter this iron-pile beacon was

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badly injured by the ice, and although it has been repaired, it is not regarded as secure, and should the ice be as heavy this winter as last, it will probably be carried away. In view of this, and the frequent and expensive repairs to the structure, its exposed position and importance as a guide to the harbor, and the apparent steady increase of the commerce of Bridgeport, it is recommended that a stone structure, similar to those lately built upon the Hudson river, be substituted for the present beacon, and an estimate of the requisite appropriation therefor is submitted.

135. *Old Field Point*.—The reconstruction of the buildings at this station has been commenced by the delivery of the materials therefor; but owing to other and more pressing operations nothing further has been done, and it is not now probable that the work can be pushed forward before next spring.

136. *Black Rock*.—By act of Congress approved March 2, 1867, the sum of \$3,400 was appropriated for repairs and renovations at this station. The greater portion of the materials required were delivered, and it was expected, as reported last year, that the work would be completed before the close of the season. However, before the work was commenced, the buildings were once more subjected to a careful examination, and it was found that the condition of the tower had become such that any money spent upon it in the way of repairs would be wasted.

The dwelling is separated from the tower by a marsh of considerable width, crossed by a narrow pathway and bridge of planks, which in easterly gales are often covered by water. This makes the attendance of the light in severe storms not only uncertain but dangerous.

Black Rock harbor is much frequented in stormy weather, and the light is of great importance, and therefore should be perfectly reliable.

It is recommended to rebuild this station, placing the tower and dwelling in close connection, on the site of the present tower, an estimate of the cost of doing which is submitted.

— *Penfield Reef*.—It is recommended to establish a light upon this reef, the proposition being based upon the recommendation of both the inspector and engineer of the 3d district, as well as of the committee on lighting of the board, at the head of which is the Superintendent of the Coast Survey. It is proposed to build the station in five feet of water, and to pursue the same plan as heretofore carried out in rebuilding certain stations on the Hudson river. An estimate of the probable cost of such a structure is submitted.

137. *Eaton's Neck*.—The repairs and renovations at this station, for which provision was made by act of Congress approved March 2, 1867, were commenced and carried to completion during the present season.

The parapet of the tower has been covered with cast-iron panels, and a cast-iron deck-plate put around the lantern. The wooden stairway in the tower has been replaced by iron steps and landings built inside of a cylindrical brick wall. Iron window frames and sashes were substituted for those of wood; an oil-room of brick, provided with closets and shelves, built in connection with the tower; the passage-way between the tower and dwelling rebuilt. The dwelling was repaired and repainted, and an addition built to it, with a cellar underneath. That portion of the dwelling not worth repair was removed and connected with the barn, which was put in repair. A new cistern was built, and the old one repaired; the fences around the garden were partly renewed, and the whole repaired. A powerful fog-signal has been authorized for this station, and will be soon placed there.

138. *Lloyd's Harbor*.—The slight repairs required at this station have been made.

139. *Norwalk island*.—The repairs and renovations authorized by act of Congress approved March 2, 1867, were commenced in September, and it is expected they will be completed before the close of the season.

140. *Great Captain's island*.—At this station the repairs and renovations provided for by act of Congress approved March 2, 1867, are in progress, and it is hoped they will be completed during the month of November.

141. *Execution Rocks*.—The repairs and renovations authorized by act of Congress approved March 2, 1867, are in progress, and are in a forward condition. They consist of the construction of a protecting pier of stone, with an entirely new keeper's dwelling thereon, together with a complete overhauling and improvement of the tower, providing it with a new lantern and iron deck-plate, and iron windows. The fog-bell will be replaced by a trumpet operated by a hot-air engine.

142. *Sand's Point*.—Repairs and renovations were authorized by act of Congress approved March 2, 1867; they are now completed, and consist of a new dwelling, placed in connection with the tower; iron stairways and windows in place of those of wood in the tower; the construction of a barn and outhouses from the materials of the old dwelling, and the repair of the fences.

— *Hart island*.—By act of Congress approved April 7, 1866, the sum of \$6,600 was appropriated "for a new light-house on Hart island, New York, or vicinity." Negotiations for the purchase of a site were opened, but it was found impossible to come to an agreement with the owner, and proceedings were instituted for the condemnation of the land required. The award of the appraisers, for an area of five acres, was \$25,000—a sum which not only largely exceeded the appropriation, but was considered so very much greater than the real value of the land that the award would have been declined on the latter ground, even had the appropriation been ample. It is recommended that no further steps be taken in this matter at present. However, should it be deemed best to make further effort to meet the wants of navigation in the vicinity, it can be done by the further appropriation of the sum of \$15,000, which, with the former appropriation, will suffice for the construction of a screw pile light-house off the point of the island, and below low water mark.

143. *Throgg's Neck*.—The tower is of wood, is old, leaky and shakey, and requires immediate and thorough repairs. The lantern is of inferior pattern, with small lights of glass, with leaky roof and deck. There is no room fit for the storage of the supplies. The dwelling also requires thorough overhauling and repainting. On account of the position of this station, immediately under the walls of Fort Schuyler, no structure of more than a temporary character can be placed there. To remedy the defects referred to above, it is proposed to replace the present lantern with a new one of the beacon pattern, with an iron deck-plate; to line the inside of the tower with matched ceiling; to arrange the lower compartment of the tower for the storage of oil and other supplies; to repair and repaint the keeper's dwelling, and to build a new cistern.

— *North Brother island*.—The steps necessary for acquiring title to the land needed for a light station were commenced last year, and commissioners of appraisal, &c., (appointed under a clause of the law of the State of New York ceding jurisdiction to the United States,) have recently made their award, which has been approved by the district judge, and accepted by the government. It is hoped that the title may be perfected in time to begin the work early in next season.

144. *Great West bay*.—In the annual report for last year it was stated, that "the stone deck of the tower leaks, and the parapet wall is cracked

horizontally³ in a line with the air registers, caused, it is thought, by the oscillation of the tower," and it was "proposed to cover the deck with an iron plate, and encase the parapet with cast-iron plates which will be fastened to the parapet and lantern deck." The repointing of the deck in the summer of 1867 has stopped the leakage, and a coating of cement wash applied to the parapet at the same time has served to remove all anxiety concerning the stability of the parapet and lantern of this fine structure. Notwithstanding the heavy gales of last winter, the cracks in the parapet wall have reappeared in but slight degree, and only on the northwest side of the parapet, and may have been caused by the shrinkage of the cement wash, rather than by the oscillation of the tower. Considering these facts, the estimate of the cost of the repairs heretofore recommended is respectfully withdrawn.

145. *Fire island*.—Nothing required except some small articles of supply, which will be furnished.

146. *Sandy Hook light-vessel No. 16*.—A new riding chain cable is required, and will be supplied as soon as a suitable one can be found. Repairs to boats, caboose, &c., have been made to the extent required.

— *Wreck of the Scotland, light-vessel No. 20*.—Under authority of the joint resolution of Congress approved March 2, 1868, the light-vessel No. 20, transferred from the fourth district, was fitted up, and on the 15th of April, 1868, was moored to mark the obstruction to navigation caused by the wreck of the steamship Scotland.

147. *Highlands of Navesink*.—The stone work requires partial repointing. The slate roof of the keeper's dwelling has been damaged by gales; the tin roofs need repainting, and the barn and stable need rebuilding. This being a station much visited by citizens from all parts of the country, it is proposed, after the completion of the repairs, &c., indicated above, to give some attention to the ornamentation of the grounds.

148. *Sandy Hook main light*.—The station would be improved by placing earth, clay, or some other suitable material around the buildings to keep the sand from blowing away.

149. *East beacon, Sandy Hook*.—The new buildings at this station were completed and the light exhibited from them on the 1st of April last. On the 16th June they caught fire from the smoke stack of the engine-house and were consumed; the apparatus and fog-signal were saved, though the latter was in a somewhat damaged condition. The buildings were entirely reconstructed upon the original plan, with slight modification noted below, within thirteen weeks after their destruction.

The fog-signal at this station is a siren, operated by taking the steam directly from a 15 horse-power boiler. The damage to the signal by the fire referred to has been repaired, and in the reconstruction of the station, the buildings covering it have been detached from the others, and greater security against fire obtained at the point where the smoke stack passes through the roof.

150. *West beacon, Sandy Hook*.—The beacon is still in danger of being washed away, and before long it may have to be moved inward. The gradual encroachment of the sea upon the bank near the tower is carefully watched by the keeper, and preparations have been made to remove the tower at short notice, when necessary.

— *One or more permanent beacons in the lower bay of New York*.—An appropriation of \$45,000 is now available for this purpose; but the difficulty of putting any permanent beacon in the lower bay that will not have an effect upon the channels that cannot be foretold, has hitherto prevented any progress in the actual construction. The problem is one of exceeding complexity, and it may be that no satisfactory solution of it can be attained.

151. *Conover beacon*.—The tower is very frail and skaky. Some three years ago it had become necessary to stay it by iron guys; the bottom timbers have decayed, and the tower has settled. The tower is higher than necessary, and the lantern is so small that it does not afford sufficient room in which to properly care for the illuminating apparatus. It is proposed to renew the timbers which have decayed, and to remove ten feet from the top of the tower, which will not only increase the room in the lantern, but render the tower itself much more stable.

152. *Chapel Hill beacon*.—Requires nothing.

153. *Point Comfort beacon*.—A working party is now engaged in raising this building, filling up the grounds around it, and in making other needed repairs.

154. *Waackaack beacon*.—Repairs will be made to the cistern and cistern pump, to the steps to the entrance to the hall and kitchen, and to the copper on the lantern deck, when the station will be in good order.

— *Cliffwood Point*.—A petition for a small light on this point, in Raritan bay, having been sent to this office, due examination into the subject was made, and the board deeming the request of the petitioners reasonable, recommend the establishment of a light of the sixth order, and submit an estimate of the probable cost thereof.

155. *Elm Tree beacon*.—Nothing required.

156. *New Dorp beacon*.—Requires nothing.

157. *Princess' bay*.—The reconstruction of the keeper's dwelling and the renovation of the out-buildings are going on, and will be completed this season.

158. *Fort Tompkins*.—Slight repairs to the dwelling have been made. The whole station will have to be rebuilt, as soon as the fortifications are far enough advanced to permit the selection of the proper site.

159. *Robbins's Reef*.—Requires nothing.

160. *Bergen Point*.—Requires nothing.

161. *Corner Stake beacon*.—Requires nothing.

162. *Passaic*.—The buildings need repainting and the masonry of the foundation needs repointing.

Elbow beacon.—Requires nothing.

163. *Stony Point*.—The dwelling needs repairing and the outhouses need rebuilding.

164. *West Point*.—Repairs to the ladder and foundations were made by the mechanics of the post during the summer. It requires nothing.

165. *Esopus Meadows*.—As reported last year, this station is in exceedingly bad condition, and should be rebuilt as soon as possible. The estimate of last year is accordingly renewed.

A new boat has been supplied.

166. *Rondout*.—The rebuilding of this station has been completed.

167. *Saugerties*.—The reconstruction of this station is in progress. The pile foundation is finished and a part of the stone work of the protecting pier laid. It is expected that the pier will be completed and the house carried up and roofed before the close of the season, leaving the inside work to be completed next spring.

168. *Four Mile Point*.—Repairs to cistern, to chimney, to one room, and to the barn are required, and when made the station will be in good condition.

169. *Coxsackie*.—This station is now in process of reconstruction, and will be completed this season. The old buildings will be then taken down, and whatever stone is in them will be placed around the new pier.

170. *Stuyvesant*.—This station is now being reconstructed, and the work will be completed this season.

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171. *New Baltimore stake light*.—The stake has been protected by stone, and is now in good condition.

172. *Five Hook Island stake light*.—This light has been removed to the dike which was built in front of it.

173. *Coeymans Bar stake light*.—A dike has been built in front of the former position of the light, and the light has been transferred to the dike.

174. *Schodaack Channel stake light*.—This light has also been transferred to the dike built in front of its former position.

175. *Cow Island stake light*.—In good condition.

176. *Van Wie's Point*.—Nothing required.

LAKE CHAMPLAIN LIGHTS.

1. The nine structures of heavy timber, filled with stone, which have taken the place of the former stake lights in Whitehall Narrows, have stood the test of the breaking up of the ice during another winter, and remain in good condition.

It is proposed that the government assume the care of the four stake lights in the Narrows, now kept by the steamboat companies, and an estimate of the necessary appropriation therefor is submitted.

— *Middle Grounds*.—Upon the Middle Grounds at the mouth of Whitehall river it is proposed to build a station similar to those constructed upon the Hudson river, and an estimate of the probable cost is submitted.

2. *Crown Point*.—When a barn and stable shall have been built at this station, and the buildings repainted, it will be in good condition.

— *Barber's Point*.—It is recommended that a light be established upon this point, and the requisite estimate therefor is submitted.

3. *Split Rock*.—A boat having been supplied this station, nothing further is required.

4. *Juniper island*.—Requires nothing.

5. *Burlington beacons*.—A light on each end of the breakwater constitute the station known by this name. They have been recently built and are in good condition.

Owing to the extension of the northern end of the breakwater, the corresponding beacon no longer marks the extremity; consequently it is extinguished, and a light from an ordinary mast-head lantern is shown from the proper point, and will be maintained as the work progresses. Upon its completion the present north beacon will be moved to the end of the breakwater and relighted.

— *Bluff Point, Valcour island*.—It is proposed to establish a light-house at this point, and an estimate of the requisite appropriation is submitted.

6. *Plattsburg beacons*.—The repairs to the north end of the breakwater having been completed by the engineer department, the corresponding beacon has been erected, and a light will be exhibited from it before the close of navigation. The station will then be in efficient condition.

7. *Cumberland Head*.—The tower and keeper's dwelling have been rebuilt upon a more eligible site, and the light will be exhibited from the new tower on the night of November 1, 1868.

8. *Point au Roche*.—Repairs to the house, the building of a barn and stable, and the continuation of the fences around the whole site are now in progress, and will be completed before the close of the season.

9. *Ile la Motte*.—This light is exhibited from the top of a stone pyramid, and is kept by a farmer who lives in the neighborhood. The

supplies are kept in his private dwelling. In stormy nights it is not to be relied on, though it is one of considerable importance.

It is proposed to build a dwelling with a lantern on top, from which to exhibit the light. The land necessary for the site is now in possession of the government, and an estimate of the cost of the requisite structure is submitted.

10. *Windmill Point*.—The lantern deck and roof of dwelling leak, and together with the ceilings need repairing, and all the wood-work requires painting.

UNLIGHTED BEACONS, INCLUDING SPINDLES.

South Point, Rose island.—Granite structure, surmounted by a spindle and cage; in good condition.

Half-way Rocks.—Spindle with square cage; in good condition.

Connimicut Point.—Granite beacon. It has been properly prepared for the reception of a lantern and lens, and on and after November 1, 1868, will appear as a lighted beacon, taking the place of Nayatt Point light-house, which will be simultaneously discontinued.

Bullock's Point.—Of granite; in good condition.

Pawtuxet beacon.—Of stone, and in good condition.

Saben's Point.—It is proposed to erect a stone beacon, and the requisite estimate is submitted for one upon the plan of that at Bullock's Point.

Punham beacon.—A stone beacon, with vane and ball on top; in good condition.

Fuller's Rocks, Providence river.—It is proposed to construct a stone beacon, and an estimate of the cost is submitted.

East Lime Rock.—A granite structure, surmounted by an iron spindle and cage.

Muscle bed, Bristol ferry.—A stone beacon; in good condition.

Borden's flats, opposite Fall River.—A stone beacon, in bad condition. An appropriation for rebuilding it is now available, and the work will receive attention.

Castle island.—A stone beacon, surmounted by a black ball. It is situated between Papoose, Squaw, and Hog islands, and guards the west channel.

Allen's Rocks, Warren river.—Is a stone beacon; in good condition.

Spindle Rock, west channel of Narraganset bay.—Is an iron spindle, 25 feet high, with square wooden cage, painted black; in good condition.

White Rock spindle, channel into Wickford harbor.—A rock, bare at low water, surmounted by an iron spindle; in good condition.

Spindle Rock, Greenwich harbor.—An iron spindle, bearing a square cage; in good condition.

Hen and Chickens, Long Island sound.—An iron spindle, bearing a square cage; painted black; in good condition.

Branford Reef beacon.—Circular beacon of gray granite, surmounted by an iron shaft, bearing a black day-mark. It is built on Branford reef; its base being bare at low water, and is now in good condition.

Black Rock beacon.—An iron pile beacon, with cage on top. It stands on the end of a shoal which extends from Fairfield, Connecticut, about two miles into the sound. It is in good condition.

Watch Hill spindle.—Stands on a rock which is bare at low water, and is surmounted by a cage; in good condition.

Sugar Reef beacon.—Is erected on the north end of the reef, (which resembles a horseshoe in shape.) It is an iron pile beacon, with cage-work day-mark in the form of a cone; in good condition.

Lord's channel.—Iron spindle; square cage-work day-mark; in good condition.

Catumb reef.—Iron pile beacon 25 feet in height, with square cage-work day-mark; in good condition. It stands on a reef running off to the eastward of Wicoposset island.

Latimer's Reef spindle.—Stands near the west point of the reef, which is bare at low water. It is an iron spindle, bearing a square cage-work, and is in good condition.

Ellis's Reef spindle.—On the north end of the reef is an iron spindle with a square cage-work; in good condition.

Groton Long Point beacon.—Stands on a large boulder at the extreme outer end of the reef off Groton Long Point. It consists of an iron pile structure, bearing a cage-work in the form of an inverted cone; it is in good condition.

Sea Flower or Potter's Reef beacon.—The reef is rocky; of about 150 feet in diameter. The beacon stood on the west side of the reef, and consisted of an iron spindle set into the largest boulder on the reef, and bearing a diamond-shaped cage-work day-mark. Under the pressure of the running ice at its breaking up last spring the boulder was overturned, the spindle acting as a lever. The spindle, which is still in the rock, was not broken, but was somewhat bent, and can easily be recovered and repaired. It is proposed to build a granite structure for the purpose of upholding the spindle and cage of the old beacon. An estimate of the cost is submitted.

Black Ledge beacon.—The reef is rocky, and about 200 feet in diameter; the beacon, consisting of an iron shaft, bearing a cage-work day-mark, formed by two cones connected at the vertices, stands on the northwest end; in good condition.

Whale Rock beacon.—This beacon is of iron, 24 feet high, and bears a globe cage-work day-mark. It stands upon the ledge, which is 50 feet long, formed of loose boulders, bare at low water; in good condition.

Crook's spindle.—Is an iron spindle with a keg on top; in good condition.

Spindle on the Whale, entrance to the Mystic river.—Was an iron spindle bearing a square cage-work and marked the sharp elbow at the narrow part of the channel. It has been carried away by ice; and since a good and reliable structure is much needed, particularly at night, it is proposed to erect in its stead a lighted beacon, of granite, as suggested in the last annual report, and the estimate is again submitted.

Saybrook beacon.—Is built of stone. It stands on Saybrook bar, and is in good condition.

Quixie's ledge.—An iron spindle with a cask on top. Stands on a rock that is dry at half tide. It is in good condition.

Stratford River beacon.—A wooden crib filled with stone supporting a spar surmounted by a cask. It stands on the west side of the channel at the entrance to Stratford river. The crib-work is old, and is breaking up under the action of the ice. It is proposed to build a new beacon, using granite in its construction. An estimate of the cost is submitted.

Outer beacon, Inner beacon, Bridgeport harbor.—Both beacons have been raised and improved, and now form very satisfactory aids to navigation.

Southport beacon, Southport Breakwater beacon.—These beacons, marking the entrance into Southport creek, are new and substantial structures of rock-faced granite laid in cement, the outer beacon bearing a shaft, crowned with a day-mark of iron, and in excellent condition.

Norwalk beacon.—Stands on the western end of Long Beach island and guides into Norwalk river. Is a new structure, of rock-faced granite laid in cement, supporting a shaft and cage of iron. It is in good condition.

Sand Spit.—Is on the south point of Sand Spit, Sag Harbor. It is an iron frame-work beacon with a cage at the top, and in good condition.

Long Beach bar, entrance to Greenport.—A petition for a beacon at this point has been presented and favorably reported upon by the inspector of the district. If built, it should be upon the plan recently carried out at Connimicut Point, Providence river; and, if authorized, will require an appropriation of the amount indicated in the estimate.

Romer beacon.—Stands on the west side of Romer shoal, entrance to the Bay of New York, and is an excellent guide to vessels passing up or down the swash channel. It is conical in shape, built of stone, and supports a square cage-work at a height of 30 feet above the sea level.

Mill reef.—Is an iron beacon supporting an iron cage upon a mast 22 feet in height. It marks a rocky reef extending from the north point of the entrance to Kill Van Kull.

Success Rock, Long Island sound.—An appropriation for a beacon on this rock is available, and plans for its erection are now under consideration.

BUOYS.

Buoys have been placed to mark the entrance to Napeague harbor, east end of Long island; the entrance to Stratford or Housatonic river, Connecticut; a rock in Harlem river, New York; and the wreck of the Scotland. Contracts have been made for keeping the buoys in Lake Champlain and Pawtucket river; and the usual arrangements for placing the buoys in the Hudson river, on the opening of navigation in the spring, have been made at the customary rates with the parties who have performed the service for many years. All the rest of the buoy service has been performed by the buoy tenders.

New London buoy depot.—For the storage of 100 tons of coal for the use of the steam tender, and the supply required for the light-houses and light-vessels, a coal bin has been put up on the buoy wharf at New London. This wharf is small, and its accommodations insufficient. It is intended to extend the wharf a distance of 140 feet, when there will be sufficient room to take care of the buoy tender and relief light-vessel without trespassing upon private property, as is now done.

Norwalk island buoy depot.—The removal of the spare buoys for the supply of the district extending from Great Captain's island eastward to New Haven, which have hitherto been kept on private land at Norwalk island, to the public land at Black Rock light-house, is now under consideration. If the removal be determined upon, a small wharf for landing the buoys, with a close shed for the storage of a small quantity of coal for the use of the tender, and a small building for the storage of paints, tools, small buoy appendages, and other articles which must be kept under lock and key, will be required. It is the opinion of the inspector that such a depot is necessary, not only to facilitate the changing of the buoys in the spring of the year, but to economize both the time and fuel now expended by the tender in returning from Long Island sound to Staten island, for a new supply of coal every time she needs it.

Goat island, Newport harbor, buoy wharf is in good condition, except that a small building for the storage of paints and other small stores is required.

A large portion of the buoys and appendages enumerated in the tabular statement are subject to transfer to other districts, and shipments of them are frequently made. A portion of the materials required for the repair of damaged iron buoys has been procured, and the work of repairing will soon be commenced.

TENDERS.

In November, 1867, the tender *General Putnam*, while lying at anchor in the Delaware river, in a fog, was run into and sunk by the steamer *Reybold*, plying between Wilmington and Philadelphia. A contract for raising her was entered into with the Atlantic Submarine Company, and operations were soon commenced, but it was not until the spring was far advanced that she was floated. Upon examination she was found to be so badly injured that she could only be made again serviceable by the most extensive repairs. The vessel was needed so badly that they were undertaken at once at Wilmington, Delaware, and will be completed before the 1st December, when she will be substantially a new vessel. Meanwhile the steam-tug *Martha Washington* was chartered and fitted for the service of the district by adding suitable hoisting apparatus, &c., and will be retained until the completion of the repairs of the *General Putnam*. All the apparatus, outfits and supplies being the property of the United States, will be removed from her when the vessel is discharged from the light-house service.

The schooner *Sunbeam* is stationed at New London, and her principal duty is to attend upon the light-vessels, beacons, and buoys from New Haven eastward. She has had small repairs made to her hull, boats, &c., on several occasions, and has had a new jib, rope, and other small articles to replace those worn out.

The vessel is old and needs a thorough overhauling, but her services have been so necessary that it has not been found practicable to withdraw her from her duties for a length of time sufficient to make the requisite examination and repair. It is hoped that with care she may be made to do service until the busy season of next year is over, when she can be attended to.

Both tenders are kept constantly busy, either in attending to buoys, beacons and light-vessels, or in transporting materials and supplies for light stations in course of construction or repair, and the work which they have to perform seems to be steadily upon the increase.

STATEN ISLAND LIGHT-HOUSE DEPOT.

In December last, the inspector's office in New York city was broken up and removed to this depot, greatly to the advantage of the service, because that portion of the duties of the inspector of the district relating to the receipt, overhauling, repairing, and shipment of illuminating apparatus and stores for general use has been brought directly under his supervision. The change has given him a better control of the tender, as well as brought him more directly in contact with the whole light-house system.

There are employed in the workshop for the manufacture and repair of lamps, apparatus, implements, and all accessories of light stations, one foreman, seven lampists, one machinist, one laborer, and for the general work of the depot in the receipt, packing and delivery of stores, keeping the grounds in order and caring for the public property, one foreman, two watchmen, eleven laborers.

The services of these persons being frequently required for discharging or loading vessels, in making repairs and much other duty out of the usual working hours, they are employed by the month at the rates which prevail in the neighborhood.

Some idea of the magnitude of the operations at this depot can be gathered from the following statements, viz.:

Statement of boxes, packages, bundles, cans, &c., received at and shipped from the United States light-house depot, Staten island, N. Y., from October 1, 1867, to September 30, 1868, inclusive.

	Boxes.	Packages, bundles, cans, &c.	Barrels and kegs.	Total.
Received.....	899	1,616	742	3,257
Shipped.....	851	622	851	2,324
Total.....	1,750	2,238	1,593	5,581

Statement of lens apparatus and lanterns received at and shipped from the United States light-house depot, Staten island, N. Y., from October 1, 1867, to September 30, 1868, inclusive.

	Lens apparatus.								Lanterns.		Total.
	First order.	Second order.	Third order.	Fourth order.	Fifth order.	Sixth order.	Steamer lens.	Range-light apparatus.	Light-house.	Light-vessel.	
Received.....	5	1		5	7	3	13	4		2	40
Shipped.....	4	2	4		5	6	16	1	1	3	54
Total.....	9	3	4	17	12	9	29	5	1	5	94

Statement of buoys and appendages received at and shipped from the United States light-house depot, Staten island, N. Y., from October 1, 1867, to September 30, 1868, inclusive.

	Can buoys, (iron.)			Nun buoys, (iron.)			Spar buoys.	Sinkers.				Ballast balls.				Total.
	1st class.	2d class.	3d class.	1st class.	2d class.	3d class.		1st class—iron.	2d class—iron.	3d class—iron.	Stone.	1st class.	2d class—cans.	2d class—nuns.	3d class.	
Received.....	26			15	45		25	28	45		120	28	25	70		427
Shipped.....	3	18	13	3	26	28		11	20	25		21	27	27	38	260
Total.....	29	18	13	18	71	28	25	39	65	25	120	49	52	97	38	687

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Articles manufactured or repaired in the lamp shop at the United States light-house depot, Staten island, N. Y., from October 1, 1867, to September 30, 1868, inclusive.

	Pressed glass lenses.	Lenses.	Lamps.	Burners.	Miscellaneous articles.	Total.
Manufactured.....	12		185	181	145	523
Repaired.....		4	87	10	10	111
Total.....	12	4	272	191	155	634

The purchase of a strip of land 49 feet 7 inches wide, extending along the whole length of the south side of the depot grounds, as contemplated at the date of the last annual report, has been effected, and a patent therefor obtained from the State of New York.

The street on the north side of the grounds, access to which was obtained under authority of a special act of Congress, appropriating the amount necessary for the purchase from the State of New York of the strip of ground, 29 feet 1½ inches wide, and extending the entire length of the grounds, has recently been fenced in by C. K. Hamilton. The United States district attorney (Hon. B. F. Tracey) was instructed to take the necessary steps to secure the government in its rights in this street, but as yet little progress seems to have been made.

The following will show more in detail the operations for the improvement of the depot, carried on during the past year, and what is proposed and recommended for the ensuing year.

Oil Vaults.—The entire completion of these vaults upon the original design is expected at an early day. The depot will then afford facilities for the storage in the best manner, and the necessary handling in the most convenient way, of 85,000 gallons of oil, of which 50,000 gallons will be stored in five large tanks of cast-iron lined with tin, and the remainder in barrels, piled in rows, in shallow iron troughs. It may be safely said that not a single drop of oil can by any chance be wasted. The entire leakage is led to a single tank, out of which it may be pumped and disposed of in whatever manner may be best. It is doubtful whether there is in the whole world an oil cellar better adapted to the purpose.

Sea-wall.—The sea-wall in front of that portion of the depot grounds extending from the former revenue wharf to the northern boundary line, and along this line to the shore, to connect with the brick wall built thereon, has been completed in a very substantial manner of large blocks of coursed granite, backed by rubble masonry, the whole being bonded in the best manner and laid in cement. Every alternate stone is a header extending through the entire thickness of the wall. As this depot will be required as long as there are light-houses to build or maintain, no pains is spared to make the construction as durable as the materials used. It is proposed, at some future time, to extend this sea-wall along the remainder of the water front.

Dredging of basin.—The basin in front of the depot, having through a long series of years become filled to such an extent that it afforded landing facilities only to vessels of the lightest draught, has been dredged out to a depth of eight feet at low water, and a large portion of the material thus obtained used in filling in behind the sea-wall. Soundings are taken every month to ascertain the probable change of the bottom of the basin. Up to the present time there is no indication of any filling in,

nor was it expected that there would be any until winter, when the heavy gales which then prevail will doubtless cause a different showing.

Building for workshops.—It was proposed to take down the two old buildings acquired by transfer from the revenue branch of the Treasury Department, and to use the materials in the construction of new workshops, but upon a closer examination it was found that one of the buildings could be profitably used for a few years longer. The construction of a fire-proof building for workshops for the manufacture of lamps and illuminating apparatus; for testing oils and other supplies purchased by contract; and for experimenting with lamps and illuminating apparatus, has been commenced, and has now reached the second story. Contracts have been made for the iron-work required, including floor-beams, stairways, roof, &c., and it is hoped that the entire building will be enclosed before winter and completed next spring. As was stated in the last annual report, no appropriation will be asked for specially applicable to this work, but the cost of its construction will be defrayed from the funds appropriated for the general maintenance of the light-house establishment, of which this building is so necessary an adjunct.

Office building.—At present the offices connected with the service of this depot, and of the 3d district, are located in the storehouse, a building which is not fire-proof, and wherein is usually stored something like a half million dollars' worth of light-house supplies and apparatus, besides records which could not be replaced. No fire should ever be permitted in or about this building, and to avoid the necessity which now exists, a fire-proof building for offices, and for the preservation of archives, should be built after the design long since approved as a part of this establishment. For this building the foundation has been laid, and the walls carried up to the water table, where the work will probably stop for a year, unless an appropriation for its continuance is specially made, as it is not thought the general fund for the support of the light-house establishment during this year and the next can afford a larger draft upon it than that required for the completion of the workshops.

Filling in and grading.—A large quantity of earth obtained from the bank at the depot grounds has been used in filling in behind the sea-wall, and for properly raising and grading the grounds. By permission, about 2,690 cubic yards of earth were obtained from the quarantine grounds, without charge, taken to the depot grounds, and used for filling in. A large quantity of earth is yet required to complete the filling. The high bank behind the depot buildings has been graded and sodded.

Landing wharf.—This wharf broke down under a load of less than 50 tons. It is scarcely necessary, in view of the character of the constructions made at this depot since it came under the control of the board, as well as those contemplated, to add that the wharf was built before the property became a part of the light-house establishment. The requisite repairs to fit it for use until a better one can be built have been made.

Basins for light vessels, supply vessels, and tenders.—During gales from the north, by the east around to the south, the basin at the depot affords no security to vessels. The subject of the construction of a suitable basin has been carefully considered by the board, both on account of the cost of the work and the difficulty of making a harbor which will not require very frequent dredging. A plan has finally been approved, and if the necessary appropriation is made the work will be carried into effect. The plan is of such a character that, if not successful, it will form a necessary part of any alternative plan.

Condition of the depot.—From the foregoing it will be seen that a great deal of work has been done during this season, and that much remains

to be done to make the depot all that it ought to be, and secure all the benefits which its establishment have rendered apparent. Its economy is of daily demonstration, and its convenience so great as to cause surprise that it was possible to get along without it. The fact that the estimates of the cost of maintaining the light-house establishment for the next fiscal year are much below what they were in this is in no small degree due to this depot. And with this decrease of expense a greater degree of efficiency is obtained, through the better quality and more uniform character of all kinds of apparatus and supplies sent out for the support of the light-houses and other aids to navigation.

FOURTH DISTRICT.

The fourth light-house district extends from Squam inlet, New Jersey, to include Metomkin inlet, Virginia, as well as Delaware bay and its tributaries. There are in this district—

Light-houses and lighted beacons	18
Light-vessels	2
Beacons, (unlighted)	None.
Buoys actually in position	78
Spare buoys to supply losses	60
Tenders, (steam)	None.
Tenders, (sailing)	1

177. *Barnegat light-station.*—The work of constructing jetties of brush-wood, and depositing stone along the beach between high and low water, was continued last year until the close of the season, at which time a number of jetties had been constructed, and 331½ tons of stone deposited. Many of the jetties were damaged by storms and others swept away by running ice, leaving enough, however, to give material protection to the beach.

On the 1st of August of the present year, shortly after the necessary appropriation had been made by Congress, operations were resumed; the damaged jetties have since been repaired, a number of new ones constructed, and 670 tons of stone deposited up to the 30th of September. The engineer of the district reports the result, so far, as satisfactory.

The base of the sand-hills along the light-house lot, which is also, to a great extent, the high-water line on the beach, has not been disturbed in the least. The beach is gaining in height and extent, the water is shoaling along the outer or channel edge of the work, and continues to shoal as the work is extended to the southward. It is therefore confidently expected that, before the close of the present season, the site will be perfectly secure. The tower and oil-house have been washed with brick-colored cement from the top half way down, and the lower half whitewashed; the pump in the assistant keeper's dwelling, and the water-conductor from the roof of the oil-house, have been repaired.

A suitable boat for the station, and a boat-house and ways, have been provided. Two panes of heavy plate glass, for the lantern, have been supplied, also drip-buckets for the oil butts.

The keeper's dwelling requires painting inside and out.

178. *Tucker's beach.*—The sand-fence constructed along the beach, in front of the buildings, is in good order, and answers the purpose for which it was constructed. The cement work put on the tower and keeper's dwelling last year has been effective in keeping the walls dry. Two panes of heavy plate glass have been furnished for the lantern.

179. *Absecon.*—Semi-monthly admeasurements of the beach, in the

vicinity of the light-house at this station, have been taken during the year.

On the ocean front several changes are noted, but, so far, none of a character to affect the safety of the light-house. The channel, from the inlet seaward, runs nearly straight. A survey to ascertain the exact course and strength of the currents will be made as soon as the more pressing duties of the engineer of the district will permit.

During the year the following repairs have been made to the buildings at the station: New wooden steps at the back doors of the principal keeper's dwelling; brick pavement repaired; new door frame in the covered way between dwelling and tower; new door from watch-room into gallery, hung on three heavy wrought-iron, galvanized hinges; repairs to porch door of principal keeper's dwelling; the tower has received two coats of cement wash, brick color; both keeper's dwellings, including the tin roofs, stairway of tower outside of lantern, watch-room gallery, and picket fence, require painting, the inside of the tower washing fawn color. A small sum will also be required for the purchase of gravel, and for repairing curb around the building.

180. *Five-Fathom Bank light-vessel No. 18* has been thoroughly repaired and supplied.

181. *Cape May*.—During the last year the fence, bridge and roadway, referred to in the last annual report, as having been damaged by storms, have been thoroughly repaired. The spindle of the governor of the revolving machinery has been supplied with new friction rollers, and copper wire furnished to secure the wire fenders or screen to the lantern. The keepers have painted the lantern and watch-room on the outside, with materials furnished them for the purpose. The tower has been washed with cement of gray or granite color. Sponge, lens cover, and stove-pipe have been supplied for use in the lantern.

182. *Cape Henlopen*.—The only work done at this station has been in placing brushwood to prevent the sand around the buildings from being blown away. Examinations conducted by the light-house engineer of the district, for a series of years, show that the dune at this station, called the "big sand-hill," situated at the north of the tower, and formed by drifting sand, had moved to the southward at the rate of 11 feet a year. The height of this hill in 1863 was 73 feet, since which it has lowered and widened at the base. At the period just referred to the old keeper's dwelling had to be abandoned, the sand having banked up to the second-story windows. Fears were entertained that a similar drift would obstruct the tower. So far, however, an effectual remedy has been found in the application of brushwood to exposed places. The keeper's dwelling requires painting inside and out; the pumps in the water cisterns need some repairs.

183. *Cape Henlopen beacon*.—The building has been painted inside and out, and the steps leading from the platform to the ground have been repaired. The double terra cotta pipes used for chimney flues, having been found to crumble, are considered unsafe, and fire-brick flues, surrounded by a wall of the same material, will be substituted for the pipes without delay. New brass faucets for the water tanks and an iron water sink have been supplied.

184. *Delaware breakwater*.—At this station a new floor for the fog-bell machinery has been laid; the roof has been repaired temporarily, the pathway around the building and from the boat landing repaired, and the building painted throughout. The changes and repairs in progress and nearly completed, are the removal of the old lantern and putting on a new one, and a new roof on the building.

185. *Brandywine shoals*.—The wooden platform around the structure, and the platform and ladders, have been repaired.

186. *Maurice river*.—A lens cover and boat have been supplied. During the coming year repairs will be required to the wooden platform, and in painting.

187. *Egg island*.—At this station the old buildings have been taken down, and the screw-pile light-house referred to in the last annual report has been erected; a new boat-house and ways built; the boat reserved at the sale of the sloop *Granite* put in order and fitted with centre-board, oars and sails, for the use of the station; new lens covers, lantern curtains, and oil measures have been supplied. The light was exhibited for the first time from the new lantern on the night of July 24, and the structure was completed on the 21st of August last.

188. *Cross Ledge light-vessel No. 19* has been thoroughly repaired and supplied.

189. *Mahon's river*.—The brick water cistern, which leaked, has been repaired, and new lantern covers have been supplied at this station.

190. *Cohansey*.—During the past year the frame oil-house has been furnished with new cover posts, and the plank platform and plastering in the kitchen have been repaired. The work of putting on a new roof, new gutters and conductors, is nearly finished. A set of lantern curtains has been supplied.

191. *Bombay Hook*.—At this station the following operations are nearly completed: new roof on the building; repair to plastering; new pumps; repair of fences enclosing building and garden.

192. *Reedy island*.—The extensive repairs to the bank around the buildings, referred to in the last annual report, were completed in October, 1867. During the past year the pathway to boat-house and the plank platform around the house have been repaired; a new pump with check valve has been placed in the water cistern, and two sets of lantern curtains have been supplied.

193. *Christiana*.—The cement of the water cistern having been loosened by frost, has been renewed. The building requires painting.

194. *Fort Mifflin*.—Repairs during the last year have been made to the corner of the pier upon which the building is founded. The sheet-iron top upon the chimney having blown away, the chimney has been carried up and arched over with brick; two panes of plate-glass and three foundation lamps have been supplied.

195. *Fenwick's island*.—Repairs made; a galvanized iron weight-tube, with the necessary fixtures for the weight of the flashing machinery, has been placed in the tower; sill of the wash-room window renewed; fireplace in the kitchen repaired. Repairs required: To keeper's dwelling, painting inside and out; to fence enclosing the light-house.

196. *Assateague*.—The works in construction at this place, referred to in the last annual report, have been completed; the tower and keeper's dwelling on the 31st of October, 1867. During the year now closing the iron hand-rail has been put up in the tower, the tower and oil-house washed with brick-colored cement, and the brass tablet plate placed on the tower.

BUOYS IN POSITION.

The buoys at the following *inlets* are attended to and kept in position by contractors:

Barnegat, Little Egg harbor, including Tucker's cove, Absecum, Great Egg harbor, and Chincoteague.—This service is reported to have been performed in a satisfactory manner at all these places with the exception of

Barnegat inlet, respecting the buoyage of which complaints have been made, which are now under investigation; and any neglect or defect which may be found will be promptly corrected.

The buoys in Delaware bay and river have been in charge of the master of the buoy tender belonging to district, and have been kept in serviceable condition.

Spar buoys, forty feet long, painted, have been placed to mark two wrecks in Delaware bay; notices in regard to which have been published.

CONDITION OF SPARE BUOYS.

Barnegat inlet.—One wooden can under repair. Depot requires repair.

Little Egg Harbor inlet.—Depot has been built since the last annual report. One first-class iron sinker and ballast ball are required.

Absecum inlet.—A new depot has been built. Four stone sinkers required.

Great Egg Harbor inlet.—A new depot has been built. Four stone sinkers are required.

Delaware bay and river.—There are on hand 67 logs in the rough for making spar buoys, as they are called for.

BUOY TENDERS.

The sailing tender *Spray* has been engaged during the year in attending to the buoyage of Delaware bay and river, and in supplying the light-house and light-vessels of the district. The *Spray* had become so rotten as to require extensive repairs; in May last, therefore, she was taken in hand and is now in good working order.

The steam-tender General Putnam is attached to the third light-house district. In November, 1867, she was sent to tow a second-class light-vessel to Cross Ledge light-station, to take the place of No. 19, and bring her to Wilmington for repair. This service performed, the Putnam, while on her way to resume her station, anchored in the Delaware, above New Castle, in a thick fog, and was run into by the steamer Major Reybold, and so much injured that she was with difficulty dragged out of the channel to the Jersey shore by the revenue cutter Seward.

Late in November, 1867, a contract was made with the Atlantic Submarine Company to raise the Putnam; but the season being too far advanced, and the condition of the vessel such as to render the operation difficult, it was not accomplished until last July, when the Putnam was transferred to the railway of Messrs. E. & C. Moore, of Wilmington; and, after a close examination of the condition of the vessel, a contract was made with Messrs. Moore to repair her hull and engines and place her in serviceable condition. The renovation and equipment of the Putnam will be finished and the vessel restored to her station within the limits of the contract.

FIFTH DISTRICT.

The fifth light-house district embraces the coast from Metomkin inlet, Virginia, to include New River inlet, North Carolina, as well as Chesapeake bay and tributaries, and Albemarle and Pamlico sounds.

There are in this district—

Light-houses and lighted beacons	65
Light-vessels	3
Beacons unlighted	89

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Buoys actually in position.....	472
Spare buoys to supply losses.....	297
Tenders, steam.....	2
Tenders, sailing.....	None.

(NOTE.—In this summary are embraced the light-house stations at Bogue Banks and Bodies island, which have not been re-established since their extinction in 1861.)

LIGHT-HOUSES, LIGHT-VESSELS, AND LIGHTED BEACONS.

197. *Hog island*.—Window frames and sashes in tower repaired; a door and frame supplied; all wood-work painted; lantern painted inside and out; an enclosure, picket fence, 40 feet square, built around the tower, and a similar fence built, 80 feet square, for garden; new set of blinds for windows of dwelling house fitted, hung, and painted; in the dwelling, doors, windows, and floors repaired; hearths relaid; plastering in all the rooms repaired; all wood-work painted two coats; house, tower, and fences whitewashed two coats; new glass set where required, and landing wharf repaired; cistern put in good order.

It is recommended that the present lamp (fountain) be removed and a Franklin lamp substituted in its place. Slight repairs to the roof of the dwelling are also reported to be necessary.

198. *Cape Charles*.—A few minor articles required for the proper maintenance of this station have been supplied.

199. *Cape Henry*.—Plate glass; five plates have been supplied for use in the lantern whenever it should be required.

200. *Willoughby Spit light-vessel No. 21*.—From the effects of the severe storm of January 21, 1868, this vessel parted her moorings at a defective shackle, and on the morning of the 23d of the same month, while endeavoring to reach a harbor, was taken in tow by the revenue cutter *North-erner*, and anchored in Hampton Roads. On the 24th of January she was, with the assistance of the revenue cutter *Nemaha*, replaced on her station, having been supplied with new moorings. The old moorings, embracing anchor and 75 fathoms of chain, were subsequently recovered by the tender *Heliotrope*. A new shackle was substituted for the broken one, and the end of the chain having been passed into the vessel, she has since lain at her original moorings. During the past summer it was found that during heavy weather the vessel leaked to a considerable extent above her copper. The sides have been calked, and are now in good condition. The deck inside the lantern house is rotten, as is also the lantern mast at the partners; these defects have been temporarily remedied. The vessel has been painted, and a new bowsprit provided to replace one broken off by collision with an outward-bound steamer December 6, 1867. A new main deck awning has been supplied. Light-vessel No. 23, recently marking Smith's Point light-station, is now being repaired, preparatory to being placed on this station; when No. 21 will be withdrawn and sent to Windmill Point.

201. *Old Point Comfort*.—No repairs to this station have been found necessary during the year.

202. *Crane Island shoal*.—Iron work of foundation and outside of superstructure painted two coats; tin roof repaired; lantern painted inside and out, and wood-work of two rooms inside, two coats; new glass set in windows.

203. *Naval Hospital*.—This structure has been rebuilt and enlarged, and the lantern raised about nine feet higher, thus increasing the range of the light.

204. *White shoal*.—Iron-work of foundation and tin roof painted two coats; railing around gallery repaired; new glass set in windows. It is recommended that a Franklin lamp be substituted for the constant level lamp now in use.

205. *Point of Shoals*.—Framework of house wherever decayed repaired; also railing around gallery repaired; iron-work, tin roof, and lantern, inside and out, painted two coats. It is recommended that the present constant level lamp be replaced by a Franklin lamp.

206. *Deep Water shoals*.—The new light-house at this place, which at the date of the last annual report was under construction, was completed and lighted on the evening of January 15, 1868.

207. *Jordan's Point*.—No repairs required.

208. *Cherry-stone*.—New cooking stove supplied, and boat repaired.

209. *Back river*.—Entrance doors refitted with new locks and hinges; steps to porch repaired; new glass set in windows; lantern and wood-work painted inside and out two coats; house and tower whitewashed; rip-rap stone collected and placed around the tower to serve as a break-water; old guard-house on the beach moved up to the dwelling for use as an outbuilding.

210. *York Spit light-vessel No. 24*.—New main deck, awning, and bedding for crew supplied. This vessel is now in good condition, except the lantern mast, which is defective at the partners. This mast has been securely stayed to answer temporarily. New water casks and crotch for the main boom have been supplied. The vessel has been thoroughly painted.

211. *New Point Comfort*.—Window frames and sashes in tower repaired; all wood-work and lantern painted inside and out two coats; roof of dwelling re-shingled, and new rain-water gutters supplied; doors, locks, and hinges repaired; porches and inside of dwelling painted two coats; new pump to cistern provided; house, tower, and fences whitewashed, and the latter rebuilt; new glass set in windows.

212. *Wolf Trap light-vessel No. 22*.—Vessel thoroughly painted. There is reason to believe that the bottom of this vessel is in want of repairs, and so soon as the services of a relief vessel are available to take her place, she will be withdrawn for examination and repair; above water she appears to be in good order.

213. *Stingray Point*.—Iron foundation and the superstructure painted two coats; locks and hinges repaired; lantern painted inside and out two coats; new glass set in windows where required.

214. *Windmill Point light-vessel*.—This vessel was removed by the rebels in 1861, and has not since been restored. Instructions have been given to re-establish the light so soon as a suitable vessel is available. Light-vessel No. 21, after being withdrawn from Willoughby Spit, where she now is, will be placed to mark this station.

215. *Watts's island*.—Revolving machinery of illuminating apparatus repaired.

216. *Jane's island*.—In good condition.

217. *Somers's cove*.—In good condition.

218. *Smith's Point*.—A screw pile light-house has been erected to take the place of the light-vessel formerly marking this station, and the light was exhibited for the first time on the evening of September 9, 1868.

219. *Fog Point*.—In good condition.

220. *Clay island*.—In good condition.

221. *Point Lookout*.—In good condition.

222. *Hooper's straits*.—In good condition.

223. *Cove Point*.—A large portion of the tower has been re-cemented

and whitewashed two coats; sashes and frames in tower repaired and painted; lantern painted inside and out; shingling on roof of dwelling repaired; doors, sashes and hardware in dwelling repaired; wood-work in same painted: fire-hearths and walks around house re-set; new pump provided for cistern; new glass in windows set where required; new fog bell frame erected in place of old structure, found to be entirely decayed.

224. *Sharp's island*.—Iron-work of foundation painted two coats; also dwelling and lantern two coats inside and out; new glass set where required, and tin on roof thoroughly painted.

225. *Thomas's Point*.—Window frames and sashes in tower repaired; wood-work and lantern painted inside and out, two coats; doors, sashes and window-shutters in dwelling, also locks and hinges, repaired; plastering in all rooms repaired; fire-hearths relaid, and dwelling painted inside two coats; cistern house rebuilt and new pump supplied; gutters and conductors to roof repaired; small smoke-house eight feet square built; new glass set where required; fences repaired, and, as well as the tower and dwelling, whitewashed two coats.

Bloody Point and Love Point, on Kent island.—Numerously signed petitions for the establishment of lights to mark these points in Chesapeake bay having been forwarded to the Board, with a report as to their necessity from the inspector and engineer of the district, the subject received careful consideration, which resulted in an approval of the objects asked for. Estimates to cover the cost are submitted.

226. *Greenbury Point*.—Doors, sashes, window-shutters, also locks and hinges, repaired; new porch to front door built; all wood-work and the lantern painted inside and out, two coats; plastering in all the rooms repaired; rain-water gutters and conductors renewed; new pump for cistern supplied; picket fence 600 feet to boundary of lot erected, and whitewashed two coats; boat belonging to the station repaired.

227. *Sandy Point*.—Cistern re-cemented and pump repaired; new cellar steps and door supplied; lantern painted inside and out; also brick walls of dwelling painted one coat; wood-frame of bell tower and fences whitewashed and repaired; the old boat having, by reason of long use, become unfit for further service, has been replaced by a new one; Franklin lamp substituted for constant level.

228. *Seven-foot Knoll*.—Slight temporary repairs made to boats. One of these boats is represented to be too badly damaged to warrant the expense of repairs, and a new one will be required.

229. *North Point*.—In good condition.

230. *Fort Carroll*.—Platform, steps of tower and bell-frame repaired; lantern and dwelling painted inside and out; new glass set where required; a Franklin lamp has been substituted for the constant level lamp heretofore in use.

231. *Brewerton channel*.—The work on the lights to mark this channel in Patapsco river, which was under progress at the date of the last annual report, has been completed, and the lights will be exhibited for the first time on the evening of November 1, 1868. These two structures, one near Hawkins's Point, the other on Leading Point, are distant apart $1\frac{1}{2}$ mile, bearing N. W. and S. E. from each other, both being exactly in range with the axis of Brewerton channel. The front light, Hawkins's Point, is built in six feet water, upon a screw pile foundation, with a frame superstructure to accommodate two lights, one above the other, at heights respectively of 28 and 70 feet above ordinary tides, the space between them being open. The rear light, Leading Point, is built on the bluff point, and consists of a brick dwelling surmounted by a lantern, showing one light at an elevation of 40 feet above the ground, and 70

feet above ordinary tides. When a vessel is on the true course coming up or going down the channel, the three lights will be seen in line, one above the other; but whenever this course is departed from, however slightly, to port or starboard, a corresponding change in the positions of the lights will be observed.

232. *Pool's island*.—In good condition.

233. *Turkey Point*.—A Franklin lamp has been substituted in place of the constant level or fountain lamp heretofore in use.

234. *Fishing Battery*.—Franklin lamp substituted for constant level lamp. The boat belonging to this station being old and no longer fit for service, has been replaced by another in good condition.

235. *Havre de Grace*.—In good condition.

236. *Piney Point*.—In good condition.

237. *Blackiston's island*.—In good condition.

238. *Lower Cedar Point*.—In good condition.

239. *Upper Cedar Point*.—In good condition.

240. *Fort Washington*.—In good condition.

241. *Jones's Point*.—In good condition.

242. *Bowler's Rock*.—A screw-pile light-house has been erected to take the place of the light-vessel formerly marking this station, and the light was exhibited for the first time on the evening of June 10, 1868.

243. *Bodies island*.—This light-house was totally destroyed by the rebels during the war, and the board does not recommend its re-establishment; but, instead, it is recommended to build between Cape Henry and Cape Hatteras—a distance of 120 miles of dangerous coast, now unmarked by any light—three light-houses of the fourth order, and an estimate of the cost is submitted.

244. *Cape Hatteras*.—An appropriation is available for rebuilding this important light-house, and the requisite materials therefor are now being collected. Contracts for the brick have been entered into, a tram road of the Peteler pattern has been contracted for, and every other necessary preparation will be made looking to the commencement of work early in the ensuing season.

Since the estimate for this work was submitted to Congress it has been found that the interests of commerce require a tower of much greater elevation than was provided for. At the time of making the estimate it was supposed that a tower of 150 feet in height (the ordinary altitude of first-order towers) would answer every requirement, but it is now deemed necessary to erect a structure having a focal plane of 180 feet. This increased height will augment the cost of the structure, and an estimate of the additional amount required is submitted.

To the present tower new plate glass for lantern and window glass to dwelling have been supplied.

245. *The Beacon* light requires repairs.

246. *Ocracoke*.—A large portion of the tower has been recemented, and whitewashed two coats. Lantern and all wood-work in keeper's dwelling and tower painted inside and out two coats; lantern deck and sashes and frames repaired; stairway renovated extensively, putting in 33 feet of newel 14 inches diameter; one side of roof of keeper's dwelling reshingled and other side repaired; fire-hearths and brick walks around the house relaid; plastering repaired in every room; also doors, sashes, and hardware; floors repaired where necessary, and dwelling whitewashed.

247. *Southwest Point of Royal Shoals*.—Iron-work of foundation painted two coats and the outside of superstructure one coat; lantern painted inside and out; new glass set where required.

248. *Northwest Point of Royal Shoals*.—Painted iron-work of founda-

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tion and dwelling two coats, also lantern inside and out; new glass set where required; gallery railing repaired, and tin roof extensively; new water casks supplied; also new locks and hinges.

249. *Harbor island*.—Iron-work of foundation painted two coats, dwelling one coat, and lantern inside and out two coats.

250. *Brant island*.—Iron-work of foundation painted two coats, outside of dwelling one coat, and lantern painted inside and out two coats; locks and hinges to doors repaired and new glass set where required; new cooking stove and fixtures supplied.

251. *Neuse river*.—Iron-work of foundation painted two coats, outside of dwelling one coat, and lantern inside and out two coats; new glass set where required; new cooking stove and fixtures supplied.

252. *Pamlico Point*.—New boat supplied.

253. *Long shoal*.—Iron-work of foundation painted two coats, lantern inside and out two coats, also two rooms inside; new glass set where required.

254. *Roanoke marshes*.—Iron-work and outside of dwelling painted two coats; gallery railings and tin roof repaired; new glass set where required; new cooking stove and fixtures supplied and new boat furnished.

255. *Croatan*.—Iron-work of foundation painted two coats; also outside of dwelling, and lantern inside and out; new glass set where required; a new cooking stove and fixtures—also materials for boat falls—supplied.

256. *North river*.—Iron-work of foundation painted two coats; also lantern inside and out; new glass set where required; new cooking stove and fixtures; also materials for boat sails supplied.

257. *Wade's Point*.—Iron-work of foundation painted two coats; also lantern inside and out; landing platform raised two feet higher; new boat falls supplied.

Laurel Point.—Several petitions, numerously signed, asking for the establishment of a light at this point, to facilitate the navigation of Albemarle sound, having been forwarded to the Board by the inspector of the district, with his report as to the necessity for the light, the subject received careful consideration, and the Board is of opinion that a light at or near that point is desirable. An estimate of appropriation required is submitted.

258. *Roanoke river*.—Iron-work of foundation and outside of dwelling painted two coats; lantern painted inside and out; new glass set where required.

259. *Cape Lookout*.—In good condition. The old tower at this place is old and dilapidated, but answers very well as a day mark for passing vessels.

260. *Bogue Bank light-house and beacon*.—These lights were entirely destroyed by the rebels, and have not yet been re-established.

At the date of the last annual report the appearance of the ground at Lazaretto Point light-station led to the belief that the yield of iron ore would be equal to that of previous years; but as the work of excavation progressed it was found that whatever amount of ore remained unexcavated was within the garden lot and running toward the keeper's dwelling. It was not deemed advisable to disturb the garden lot, especially as the quantity of ore to be obtained thence would be inconsiderable. On making his last payment the contractor proposed a cancellation of the lease, but this has been deferred until he shall have filled in the excavations and properly levelled the ground.

Since the last annual report 156 tons of ore have been excavated, for which the sum of \$243 84 has been received.

Upon the withdrawal of light-vessel No. 23 from Smith's Point, Ches-

peake bay, (upon the completion of the new screw-pile light-house at that place,) she was towed to Norfolk by the buoy tender *Heliotrope* and placed on the railway for examination and repair preparatory to taking the place of the light-vessel at present marking Willoughby Spit, which, having but one lantern, does not suitably mark the station. The repairs are now in progress.

Light-vessel No. 25 has been thoroughly overhauled, necessary repairs made, and placed to mark Deep Water Shoals, James river, during the construction of the light-house at that place. Upon the completion of the light-house she was taken to Norfolk and securely moored. She is kept in readiness for service as a relief vessel.

Light-vessel No. 28 is the regular relief vessel of the district. She has been repaired where necessary, and has rendered valuable service in marking temporarily Bowler's Rock in Rappahannock river and Smith's Point in Chesapeake bay, during the progress of construction of light-houses at those points. While at Smith's Point, and during a gale of wind, the main boom was broken. A new one has been supplied and she is now in good condition.

The old iron vessel formerly marking Willoughby Spit, being worn out and unfit for further service, was, after having been stripped of all articles of value to the light-house service, sold at public auction for the net sum of \$2,113 73 and the proceeds turned into the treasury.

UNLIGHTED BEACONS.

The general condition of the beacons and stakes of the district is reported to be good, and these aids to navigation have received such attention as the exigencies of the service would permit.

At North Landing river four beacons, consisting each of a spar surmounted by a barrel, have been placed, and are found to materially assist in the navigation of the river.

One of the beacons off Bell's island is reported to have disappeared from its station. A new one has been prepared and will be placed at the first opportunity.

Core sound.—Beacons and stakes marking the channel through the sound replaced.

Blair's channel.—It has recently been learned that all the beacons have disappeared from their proper places in this channel, excepting the first beacon, which still remains. Whenever the services of the buoy tender can be spared she will be sent to attend to the duty of replacing these beacons.

The other beacons of the district are in good condition.

BUOYS.

The buoys in Metomkin, Watchapreague, Hog island, Matchapungo and Sand Shoal inlets, on the eastern coast of Virginia, have been properly attended by contract. A new contract for this service for the year ending 30th July, 1869, has been entered into.

The buoys in Cape Henry channel, Hampton Roads, Norfolk channel, Hampton creek, Elizabeth river, James river, York river, Mobjack bay, Pianketank river, Rappahannock river, Great Wicomico river, Potomac river and tributaries, have been carefully attended during the year by the steam tender of the district.

In Chesapeake bay, from the Capes of Virginia to Havre de Grace, Maryland, the buoys have been regularly attended to. Two new buoys

have been placed to mark wrecks, viz., one to mark the wreck of the schooner Mary E. Killinger, which lies in three fathoms water west by south half south from Cape Charles light-house, distant seven miles, and one to mark the wreck of the revenue cutter Nemaha, lying in five and a half fathoms water off the mouth of the Great Wicomico river, Windmill Point bearing south by west half west, distant nine and a half miles. The buoys in West river, Annapolis Roads, Bodkin Swash, Patapsco river, North Point creek, Swan Point channel, Cherrystone inlet, Hooper's straits, Kedge's channel, Tangier sound, Little Annamessix river, Wicomico river, Pocomoke sound, Great Choptank river, Eastern bay, St. Michael's river, Wye river, Chester river, Little Choptank river, have been visited by the tender and the buoys overhauled and replaced.

The buoys in Hatteras inlet, Ocracoke inlet and bar, Nense river, Pamlico sound and river, Hyde county landings, and Bell's bay, Croatan sound and Albemarle sound, up Roanoke river to Plymouth, have been kept in good order.

In Alligator river, the spar buoys heretofore marking the channel have been replaced by iron nun-buoys of the third class, and an additional spar buoy placed off Sandy Point, about two and three-fourths miles above the mouth of the river.

In Core sound the buoys have been properly replaced by the buoy tender.

Care has been taken to provide the district with a large number of spare buoys and accessories, and a lot (290 pieces) of kentledge removed from the condemned iron vessel from Willoughby spit were appropriated to use as buoy moorings and fitted accordingly.

An additional number of spars for buoys has been contracted for.

TENDERS.

During the year the buoy tender *Heliotrope* has been constantly employed in the work of replacing buoys and carrying supplies to light-stations. On the 1st February last, while in North Carolina, the cross-head of the air-pump broke, which accident compelled the vessel to remain inactive for 12 days, when a new cross-head was procured and fitted.

Upon the return of the vessel from the sounds of North Carolina she was taken on the railway and her copper repaired and hull caulked above water mark, needful repairs have also been made to the engine, deck planking, canvas covering of hurricane deck.

The steamer *J. N. Seymour* has been steadily employed in connection with the engineering branch of the service.

The great extent of this district seems to render it necessary to provide another vessel, a sailing vessel of small size, to attend exclusively upon the buoys in the lower part of the district, including Albemarle and Pamlico sounds, and the Board hopes to be able in the course of the coming season to make such arrangements as will enable it to detail a vessel for this duty.

DEPOTS.

A suitable storehouse for the security of supplies, sails, buoy accessories, boats, and other valuable property, is much needed in this district, and it has been found necessary to store certain articles of spare property on hand in the hold of an unemployed light-vessel, and in the event of that vessel being required for duty a transfer of these articles must be made to some other vessel, or have them placed on private storage at heavy expense.

SIXTH DISTRICT.

The sixth light-house district extends from New River inlet, North Carolina, to include Cape Canaveral, Florida. There are in this district—

Light-houses and lighted beacons.....	50
Light-vessels.....	6
Beacons, unlighted.....	3
Buoys actually in position.....	130
Spare buoys, to supply losses.....	35
Tenders, steam.....	None
Tenders, sailing.....	2

261. *Federal Point light station.*—Nothing has been done at this station during the year, and having been erected in 1866 it is believed that only incidental repairs will be required next year. The flues at this station are of terra-cotta pipes, which at other localities have been found objectionable, and it may be necessary to remove them and substitute other material.

When this light-house was built the site occupied came within the limits of Fort Fisher and was in possession of the government. The land was owned by a private individual and has recently been restored to him by the government. Compensation being asked for the land occupied by the light-house establishment, steps are now in progress for its purchase.

262. *Frying-pan Shoals light-vessel No. 29.*—This vessel was relieved June 29, 1868, by the Relief and brought to Charleston, and after having been thoroughly repaired was returned to her station.

263. *Cape Fear light station.*—Discontinued in 1866 and not since re-established.

264. *Oak island.*—Range lights for crossing the bar western entrance to Cape Fear river in good condition, and it is thought that only incidental repairs will be required during next year.

265. *Price's creek.*—Not yet re-established; examinations have been made as to the necessity of changes in the positions of these ranges.

266. *Horseshoe shoal.*—The screw-pile structure, reported at the date of the last annual report as being on hand, was erected at this station and lighted for the first time on the evening of March 9, 1868. On February 25, the work being well advanced, signs of settlement were first discovered, and the opposite side was weighted to make the settlement equal if possible. On the 23d of March the work suddenly settled three feet, and in the precarious state of the structure the light was discontinued, and the light-house, as far as practicable, removed and placed in store at Newbern, North Carolina. The parts left standing on the shoal are the piles, with five-foot screws, sleeves and lower tension rods.

267. *Orton's Point.*—The materials for re-establishing this station have been procured and are stored at Wilmington, North Carolina.

268. *Campbell's island.*—This station has not been re-established since its discontinuance in 1861.

269. *Upper jettee.*—These range lights were extinguished by the rebels in 1861, and the structures entirely destroyed.

270. *Georgetown.*—As this station was re-established and placed in complete condition in 1867, and a new keeper's dwelling erected at the same time, no repairs have been required, and it is thought that only incidental renovation will be necessary during the next year.

271. *Fort Point, near Georgetown, South Carolina.*—This light was extinguished and building destroyed in 1861. Its re-establishment at this time is not deemed necessary.

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272. *Cape Romain*.—During the year general repairs have been made to the keeper's dwelling as follows: joints of wall raked out and repointed and cement washed; flashings around chimneys examined and replaced; roof repaired; chimneys cement-washed; cistern built; gutters to eaves and conductors to cistern furnished; plastering repaired; new door and frame made for porch. To the assistant keeper's house: new roof built; porch made in front; plastering repaired; joints of wall raked out and repointed; cistern built; gutters and conductors provided; doorway cut through wall and frame, and door to back kitchen furnished; an old brick one-story building in a dilapidated condition, formerly used as an oil-house, has been torn down and the brick used for cisterns; all new work painted; boat-house 13' x 30' erected and suitable tackle furnished.

The tower is in good condition with the exception of the exuding and wasting of the mortar on the inside. But few if any repairs will be required next year.

273. *Bull's bay*.—This station has been re-established, and the light was exhibited for the first time on the evening of August 31. A new lantern and apparatus have been placed; dwelling furnished with new inside doors, walls furred, lathed and plastered; outside walls repointed and cement-washed; roof repaired; wood-work painted; conductors furnished to cistern and general renovation made; boat-house built and new boat with sails, &c., furnished.

274. *Rattlesnake Shoal light-vessel No. 30*.—This vessel has continued during the year at her station to mark Charleston bar; no repairs were necessary.

275. *Weehawken light-vessel No. 31*.—This vessel needs general repairs; her deck is too old to admit of calking, and it is proposed to cover it with some water-proof material as a temporary expedient. It is feared that it may be found necessary to entirely remove her and substitute another vessel.

276. *Charleston*.—This station was extinguished by the rebels in 1861, and the structure destroyed. An examination of the locality has been made with a view to the location of range lights. A final decision upon the subject has been deferred to await the completion of new and detailed surveys rendered necessary by change of channels since 1861.

277. *Sullivan's island*.—The temporary light marking this station is located upon private property, and negotiations for the purchase of the land required for the sites of the range lights authorized at the last session of Congress are in progress.

278. *Fort Sumter*.—In good condition.

279. *Castle Pinckney*.—In good condition.

280. *Battery beacon*.—In good condition. Fence built around base of shaft.

281. *Hunting island*.—This station was discontinued and the buildings destroyed in 1861.

282. *Combahee bank*.—A screw-pile light-house has been erected in place of the light-vessel formerly marking this station; and light exhibited for the first time on the evening of February 22, 1868.

283. *Martin's Industry light-vessel No. 32*.—This vessel is in good condition. No repairs have been required during the year.

284. *Bay Point*.—When the sale of public property belonging to the Navy Department at this place was made, the building heretofore occupied as a keeper's dwelling was reserved from sale and turned over to the light-house establishment. It required considerable repairs to roof, &c. The tower is but temporary in its character, and is in good condition.

No steps have yet been taken towards building the light-house authorized by act of Congress approved July 28, 1866; and it is doubtful whether the light will ever be required.

285. *Hilton Head*.—Range lights for entrance into Port Royal harbor; in good condition.

286. *Fishing Rip light-vessel* No. 33.—This vessel (formerly the relief light-vessel) left Charleston May 27, to relieve the light-vessel No. 34, then at Fishing Rip station; previous to being sent down she was thoroughly overhauled.

287. *Braddock's Point, Calibogue sound*.—Negotiations are now in progress for procuring title to the requisite land at this locality, preparatory to the erection of a light-house in place of the light-vessel formerly stationed in Calibogue sound. An appropriation is available for this object, and according to the terms of the law, the work will be done by contract.

288. *Tybee*.—In good condition.

289. *Tybee Island knoll*.—Discontinued in 1861, and not re-established. An appropriation of \$15,000 for a light-house to mark this knoll was made March 2, 1867, and by the terms of the law the work is to be done by contract. The necessary preliminary steps have been taken.

290. *Cockspur island*.—A substantial boat-landing has been erected; piles cased with yellow metal; tower whitewashed; station in good condition.

291. *Oyster Beds*.—Boat-landing erected; piles cased with yellow metal; tower whitewashed; station in good condition. The keeper's dwellings for this and the preceding station have been re-boarded, new roofs supplied, and conductors supplied; fence constructed.

292. *Fig island*.—In good condition.

293. *The bay, Savannah*.—In good condition.

294. *Sapelo*.—This station has been re-established, and was lighted for the first time on the evening of April 15, 1868. The keeper's dwelling has been almost entirely rebuilt, except the walls; new roofs, sash, doors, porch in front, plastering, stairs, and painted. New lantern and apparatus placed in tower; new window frames and sash; new door frames and door; and steps largely renewed. Tower red and whitewashed; fence built.

A skeleton frame beacon 50 feet in height, on a tramway of 100 feet, has been erected in front of the tower, and distant therefrom 660 feet. The light was exhibited April 15.

295. *Wolf island—two beacon lights*.—During the year a substantial dwelling of frame for the keeper has been erected, with tower and lantern on top; the work is not yet completed. The foundation of the building consists of 11 wooden piles 12 inches in diameter, driven to a depth of 28 feet, cut off below the surface of the marsh and cased with an iron cylinder three feet below the surface, and extending four feet above to receive the caps for sills; there is a platform 10 feet wide built on wooden piles extending along the entire front, and on one side back to and in front of the kitchen. A cistern also is placed in front of the kitchen under the platform.

Beacon light.—A skeleton frame beacon on a tramway 100 feet long is built in front of the keeper's dwelling, and distant therefrom 480 feet. These lights were exhibited for the first time (since their discontinuance in 1861) on the evening of October 10.

296. *St. Simon's*.—All the buildings at this station having been destroyed by the rebels, an appropriation of \$45,000 was obtained from Congress, with the stipulation that the work should be done by contract. The necessary preliminary steps are in progress, plans and specifica-

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tions have been prepared, and bids called for, to be opened November 6, 1868.

297. *Little Cumberland island*.—In good condition.

298. *Amelia island*.—The repairs in progress at this station at the date of the last annual report have been completed and a fence constructed. A plank walk 840 yards in length has been made across the marsh to the beacon light in front, and a roadway, 680 yards, cleared.

299. *North beacons, Amelia island*.—This station has not been re-established.

300. *St. John's river*.—In good condition.

301. *Dame's Point light-vessel*.—This light-vessel, in St. John's river, was discontinued during the war and has not been re-established. The interests of commerce do not require a light at this place, and upon the recommendation of the Board, the honorable the Secretary of the Treasury has directed that the station be discontinued.

302. *St. Augustine*.—In good condition.

303. *Cape Canaveral*.—The iron light-house which, at the date of the last annual report, was in course of construction has been completed, and the light therefrom exhibited for the first time on the evening of May 10, 1868. The illuminating apparatus is a lens of the first order, revolving, showing a white light which attains its greatest brilliancy once every 60 seconds. Its elevation is 139 feet above sea level, and the light should be visible from the deck of a vessel at a distance of 18 nautical miles. Upon the exhibition of the new light, the fourth order fixed light which had been shown was discontinued.

LIGHT-VESSELS.

The relief light-vessel No. 34, belonging to this district, has been completely repaired. She is now in good condition, excepting mast, in which defects have recently been found to exist; these will be promptly remedied.

Light-vessel No. 35, formerly marked Martin's Industry. She was sunk by the rebels in Savannah river, was raised, repaired and fitted for service. Evidence of serious decay being observed, a thorough survey was held upon her and resulted in her condemnation. It was found that nearly every part of her hull was pervaded by dry rot, and to such an extent as rendered her unworthy of repair. She was accordingly stripped of every appurtenance which could be of service to the light-house establishment, and sold at auction September 25, 1868.

BEACONS, (UNLIGHTED.)

Two substantial day beacons have been erected on the oyster rocks opposite to Cockspur island.

They are built on four iron piles driven 10 feet and extending eight feet above the surface of the rock. An enclosed framework is placed on the tops of the piles 9 feet $7\frac{1}{2}$ inches square at the base, 12 feet high, and 6 feet square at the top. As these beacons are on the port side of the channel in entering, they are painted black.

A skeleton frame day beacon has been erected on the south end of Elba island, to take the place of one destroyed by decay.

BUOYS.

This district has been thoroughly buoyed out. The buoys have been lifted, examined and repainted, where necessary, and moorings examined,

with the exception of one buoy at St. Augustine bar, Florida, which has recently dragged from its position, and will be replaced as soon as possible.

A buoy has been placed to mark a sunken wreck just above Cockspur, in Savannah river; and a buoy has been placed to mark the position formerly occupied by the Dame's Point light-vessel in St. John's river.

An adequate number of spare buoys and appurtenances has been kept on hand to supply losses.

TENDERS.

The light-house and buoy vessel *Maggie*, a sailing schooner of 80 tons burden, provided in February last for this district, has been constantly employed in buoying out the different harbors and channels, and in transporting supplies to light-vessels.

On the 20th September she was docked at Charleston; was calked outside, from the water-line up; her spar and cabin decks were also calked; new bowsprit and jibboom supplied. She is now in good order, and ready for further duty.

The *Narraganset* (schooner) has been employed during the year upon engineer duty. In October last a new foremast was placed in her, and all of her spars shortened and sails reduced, thus materially increasing her usefulness. Her general condition is good.

The small schooner *Dupont* was employed as a tender upon the works at Cape Canaveral light-house, and, upon their final completion, was taken to Charleston and securely cared for. Her small size renders her incapable of performing any but minor service.

DEPOTS.

A substantial shed building, 70 feet by 25 feet, for the storage of spare buoys and accessories, and other articles kept on hand, has been erected on James island, near Fort Johnson. The wharf, however, is in a dilapidated condition, and will soon require extensive renovation.

SEVENTH DISTRICT.

The seventh light-house district embraces the coast from Cape Canaveral to include Cedar Keys. There are in this district—

Light-houses and lighted beacons.....	11
Light-vessels	None.
Beacons, unlighted.....	6
Buoys actually in position.....	63
Spare buoys to supply losses.....	43
Tenders, steam.....	None.
Tenders, sailing.....	1

304. *Jupiter inlet*.—Illuminating apparatus examined; revolving machinery and timepiece cleaned and oiled; chimney-holders enlarged.

The walls of this tower are damp during the rainy season, causing the plastering to fall off. The proper remedies will be applied. A gutter around porch roof is needed.

305. *Cape Florida*.—A new iron door has been fitted in the tower; door locks repaired; four new blinds furnished to dwelling; new boat with appurtenances and new cooking stove supplied; tripod of lamp adjusted.

An effort has been made to lessen the annoyance arising from the immense numbers of insects at this station by burning off some of the rank vegetation near the dwelling.

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306. *Carysfort Reef*.—New hinges fitted on storm doors; new revolving trucks fitted and rod lamp repaired; revolving machinery oiled and cleaned.

The necessity for a new boat being urgent, and none being available, a boat belonging to the buoy tender was altered, sloop-rigged, air-tight cases of galvanized iron fitted under the thwarts, and new boat falls fitted. New curtains supplied. Iron-work above needs painting, and below scraping and painting; new ladder and boat davits required.

Alligator Reef.—An estimate was submitted at the last session of Congress of appropriation required towards the erection of a first-class light at Alligator reef, being a part of the system for lighting the Florida reefs. No appropriation having been made, and the necessity for this light being deemed of great urgency, the estimate is again submitted.

307. *Dry Bank*.—New clamps fitted on braces; new hinges provided for tower windows; glass set where required; three new dampers for lens chimney supplied. The large accumulation of rubbish on the platform has been cleared off, giving thereby more space for the storage of fuel and necessary occupations.

The solidity of this tower, like Carysfort, seems to be perfect, though requiring a general painting above and scraping and painting below.

An iron davit for hoisting in stores is much needed. The wooden beam across the braces just above the roof, heretofore used for this purpose, has had the effect of causing a leak. Three clamps of diagonal braces below have been broken by the force of the sea; new ones are needed. A new boat is also required.

308. *Sand Key*.—Carelessness in winding up the revolving machinery having caused a displacement and consequent irregularity, the machine has been overhauled, adjusted, cleaned and oiled; timepiece cleaned and oiled. One of the old water tanks having been found unworthy of repairs, a new one was supplied. A new set of tanks on a different plan seems to be required. A new sail boat of a large size is required.

309. *Key West*.—Lightning conductor renovated; new platinum point required.

The lantern is very old and defective; the door cannot be made to shut properly. It is found that this light is frequently obscured by myriads of insects about the lantern, sometimes getting into the lamp itself.

310. *Northwest Passage*.—This station begins to show the effects of the climate. The roof of the dwelling leaks, and the station needs a general overhauling and repairs.

311. *Dry Tortugas*.—The old and rusty iron lightning conductor has been replaced by a new one of copper with horn insulators; supply pipes of burners repaired; eight panes glass set in the lantern.

This tower also shows the effects of the heavy rains in this climate. Much of the mortar on the south and southwest sides is washed out, in some places to the depth of nearly half an inch. These walls should be repointed with cement. The plastering of the oil room and kitchen has fallen down and needs repairs. A suitable enclosure fence is recommended.

312. *Dry Tortugas harbor*.—The flooring of the balcony around the lantern is much worn, and the seams in some places open, which admits rain-water inside the tower, and causes dampness and injury to the walls. The necessary remedy will be applied.

313. *Egmont*.—The dwelling has been repaired, leaks in roof stopped, and an almost entirely new porch put up. The old kitchen has been newly roofed and is now used as a storeroom; new cooking stove and accessories supplied. A suitable enclosure fence is recommended.

314. *Cedar (or Sea Horse) Key*.—In good condition.

BEACONS, (UNLIGHTED.)

Of the fifteen day-marks along the Florida reefs from Fowey rocks to Eastern Sambo, as originally established, but five now remain, the others having been lost.

Those which remain are Long Reef beacon, letter N; Elbow beacon, letter J, about $5\frac{1}{2}$ miles southeast from Carysfort reef light house; Grecian shoal beacon, letter H, on the outer edge of Grecian shoal; French reef beacon, letter G, on reef of same name; and Conch reef beacon, letter E, on Couch reef.

They are placed on the most projecting and dangerous points of the Florida reef, and within half a mile in every case of the edge of the Gulf Stream. They may be approached from seaward within a few hundred yards, but in bad weather a wider berth should be given.

These beacons are composed each of an iron shaft 36 feet in height, erected upon iron screw foundations, distinguished by a vane upon which a letter of the alphabet is painted.

The re-establishment of those which have been lost is pressed upon the Board as a measure of great importance to the navigating interests.

The day beacon at Coffin's Patches consists of an iron shaft, 6 inches in diameter and 40 feet high, surmounted at the height of 25 feet above the water by two ellipses at right angles to each other, of open lattice work, eight feet by five feet, presenting the appearance of a ball; and at the height of 33 feet by a cross of open lattice work, with arms nine inches wide and extending three feet from the shaft, and on the top a ball 15 inches in diameter. This beacon is in good order, though inclining a few degrees from the perpendicular.

BUOYS.

The buoys of the district have all been examined, cleaned, and painted; sinkers, chains, and ballast balls renewed where necessary.

The following additional buoys are recommended:

A first-class buoy on the south end of Tortugas shoal.

A first-class buoy on Rebecca shoals in place of the second-class buoy now there.

A second-class buoy off the south end of Pine island, Charlotte harbor, to guide vessels bound up Pease creek.

All the spare buoys on hand have been kept scraped and painted ready for immediate service.

TENDERS.

The buoy tender *Florida*, sailing vessel, has been thoroughly repaired, recalked, recoppered, and nearly all of her iron-work renewed. She now only requires new awnings to be as good and efficient as ever. A new suit of sails was put on her. New stern boat required. She has been constantly employed in attending upon the buoys and in carrying supplies to stations. It being found that these duties were greater than could be performed by one vessel, by the courtesy of the Coast Survey the schooner *George M. Bache*, belonging to that service, was temporarily employed, and has rendered valuable aid. Her duty being completed she was returned to the Coast Survey on September 15, after having been used for three months in buoy service.

EIGHTH DISTRICT.

The eighth light-house district comprises the coast from Sea Horse Key, Florida, to Rio Grande, Texas.

There are in this district—

Light-houses and lighted beacons.....	59
Light-vessels.....	None.
Beacons unlighted.....	2
Buoys actually in position.....	73
Spare buoys to supply losses.....	116
Tenders, steam.....	1
Tenders, sailing.....	3

LIGHT-HOUSES AND LIGHTED BEACONS.

315. *St. Mark's*.—In good condition.

316. *Dog island*.—The attention of the Board has been called to the dangerous exposure of this tower in heavy gales, being situated on a low spit, liable to be washed away in the first hurricane that may sweep over that part of the coast. The new dwelling on screw piles situated on a sand-hill about 15 feet above sea level will afford secure refuge to the keepers and their families in case of loss of tower. The ground is highly favorable for the construction of a new light-house on high ground at a moderate cost, the secure harbor, "Pilot's Cove," affording conveniences of landing materials at all times unsurpassed by any station in the district, except those in the Mississippi.

The eventual destruction of the present tower, under the circumstances stated, cannot be doubted, resulting in the extinction of one of the important lights on the Gulf coast, the destruction of public property, and involving danger to the lives of the attendants. In view of these facts the early construction of a new iron light-house, and, by reason of its position, an increase in the order of the light, is recommended.

317. *Cape St. George*.—In fair condition.

318. *Cape St. Blas*.—In fair condition. There is no dwelling provided for the keeper, who is now obliged to live in the watch room. A dwelling on screw piles within a short distance of the tower and connected therewith by a plank walk or bridge, is recommended. A bridge would seem to be requisite, as the place is overflowed in heavy gales to an extent rendering communication between tower and proposed dwelling difficult if not dangerous.

319. *Pensacola*.—In good condition. The temporary light which has been exhibited from this station since 1862 is a fourth-order lens. An appropriation for general repairs and for building a keeper's dwelling is now available, and so soon as the works have sufficiently progressed, it is proposed to fit up a first-order apparatus similar to the one in use before the war. The lantern is in perfect order for its reception.

Bar beacon, (range light).—This structure, wooden pyramidal, with steamer's lens, is in good order and quite sufficient for the purpose.

Under authority of the Department, the Barrancas and Cayca's range beacons were discontinued January 1, 1868, being no longer deemed necessary for the commerce of Pensacola. The apparatus and fixtures were removed and suitably cared for.

320. *Sand island*.—An appropriation is available for rebuilding the first-class tower formerly marking this station. The temporary wooden structure with its fourth-order lens has answered a good purpose and may be expected to suffice until the original tower is rebuilt.

Sand Island beacons Nos. 1 and 2.—These beacons were entirely destroyed during the war, and it is proposed to re-establish them when the new light is built.

321. *Mobile Point.*—An appropriation is available for the construction of a new light-house at this place, which work will be taken in hand at the same time with Sand island. The facility of communication between the two stations will enable one foreman with a suitable assistant to execute both works at the same time.

Mobile Point beacons Nos. 1 and 2.—These were entirely destroyed during the war. Cheap wooden structures are quite sufficient and will be erected during the progress of the new building for main light.

322. *Choctaw Point.*—As stated in the last annual report, the old site is probably ineligible by reason of changes in the channel induced by artificial obstructions. A detailed survey will be required before any conclusion as to proper site or character of structure can be arrived at.

Choctaw Pass.—These range beacons in connection with the foregoing light-house were entirely destroyed during the war. Their re-establishment as to location and time will necessarily depend upon the result of investigations concerning the main light.

323. *Round island.*—In good condition. Some trifling repairs are required, such as rendering water-tight the gallery deck, which leaks from unequal expansion of the cast iron and cement of which the deck is composed. The lantern and gallery are cast in one; the gallery being found too small was widened by building out the brick cornice, and the portion outside of the iron gallery is cemented. Various expedients have been tried to remedy the defect, but without more than partial success.

324. *East Pascagoula river.*—Renovated and put in complete order during the year and the light exhibited for the first time since 1861 on the evening of April 20, 1868.

The growing importance of Pascagoula river, which penetrates far into the rich pine forests bordering the northern shore of the Mississippi sound, the artificial deepening of the bar of the river and the natural deepening of the entrance called Horn Island Pass, have induced the Board to recommend, after thorough examination of the subject, the erection of a new light-house on *Horn island*. The ground is very favorable, being hard sand, and more elevated than Ship island. The surrounding country affords lumber and brick of excellent quality, and a brick structure is recommended as less costly than any other of sufficiently permanent character. Vessels of 14 feet draught of water can find safe anchorage in storms under the lee of this island.

An appropriation of \$20,000 will be required for this light-house, and the necessary estimate will be submitted.

325. *Ship island.*—In good condition.

326. *Biloxi.*—In consequence of difficulty in making this light-house by day, through reason of the tower being painted black and shown against a background of dark pine woods immediately adjoining, the color of the tower has been changed to white. Station in good condition.

327. *Cat island.*—The buildings at this place were destroyed during the hurricane of 1860. The screw-pile dwelling on the land was burnt at the commencement of the war. The lantern was subsequently taken possession of and applied to Tchefuncti light station.

This light is important as a guide to vessels through the south pass of Cat island, through Pass Marianne, and to the entrance into Cat island harbor, into which 16 feet may be carried at low tide, giving complete shelter in all kinds of weather, especially the dreaded "northers."

This light will be re-established so soon as time and opportunity permit.

328. *Pass Christian*.—In good condition.

329. *Merrill's Shell Bank*.—In good condition.

330. *St. Joseph's island*.—This island had washed away to considerable extent and it was found necessary to move the structure further back, about 25 feet from its former position. Nine piles were driven to a depth of nearly 60 feet in the positions to be occupied by the new piers. The ground around these piles was excavated as far as practicable and surrounded by brick masonry, thus completely protecting the wooden piles from the influence of the atmosphere and damage by worms. The piers are two and a half feet square and connected by diagonal tension rods of two and a half inch iron. Outside the foundation of the light-house a breakwater was built to protect it from the wash of the sea in southeast winds, which are the only ones capable of doing any damage. The space under the house between and around the piers was filled up with concrete. The station is now being painted and at the same time five panes of lantern glass will be put in, some of which may have been broken during the operation of moving the house back to its present position.

The work done is of the most substantial character and will probably preserve the light-house for a long time.

331. *Rigolets, (Pleasanton's island)*.—Tower in good condition. The keeper's dwelling requires repairs to roof and galleries, which have been authorized but not executed.

332. *Proctorsville*.—Destroyed in the hurricane of 1860 and not re-established. This station is comparatively unimportant, and a wooden structure, of an inexpensive character, would answer every requirement.

333. *West Rigolets*.—In good condition.

334. *Bon Fouca*.—Destroyed in 1862 and not re-established.

The important point in this vicinity seems to be Pointe aux Herbes, directly opposite, on the south shore of the lake, forming the principal landmark for all steamers and sailing vessels trading in the lakes. The abandonment of the present site and the erection of a light-house on Pointe aux Herbes is recommended, and an estimate of appropriation necessary will be submitted.

335. *Port Pontchartrain*.—The breakwater around the tower, which was in progress at the date of the last annual report, was completed in December, 1867. It is a solid and substantial work. The station has been thoroughly painted and a new cistern built.

336. *Bayou St. John*.—The work of erecting the beacon-light upon the old screw-piles of the former structure at this place is actively progressing. The iron work has been made by contract and transported to the site. The structure will be finished in a few days.

337. *New Canal*.—The work of rebuilding the breakwater at this place, and of general repairs to the station, is in progress.

338. *Tchefuncti river*.—The new light-house, which was in course of construction at the date of the last annual report, was completed and the light exhibited for the first time on the evening of December 1, 1867. A recent inspection found this station in perfect order.

339. *Pass Manchac*.—In good condition.

340. *Chandeleur*.—In good condition.

Grand Grozier.—An appropriation for the construction of a light-house at this place was asked of Congress at its last session, but not granted. The estimate will be again submitted.

341. *Pass à l'Ouvre*.—The dwelling at this section, of frame resting upon nine brick piers, has settled down very uniformly and equally about three feet, so that the sills are at present only about 18 inches above the

ground. It is proposed to raise this structure to about its former level, and at the same time surround it with a fence of piling, to protect it from drift-logs, which, being afloat at high water and drifting against the piers, would endanger them.

342. *South Pass*.—Slight repairs are required to the sills of the house gallery, rain-gutters, reshingling, &c.

In view of the great importance of this light, which is the first one made by all vessels coming from the northern ports and the West India islands, and frequently by those coming from the western and southern coast of the Gulf, the insufficiency of the present third order light, and the perishable nature of the present structure, which is entirely of wood and surrounded by high swamp cane, readily set on fire by malicious or careless persons; and in consideration of the fact that the present light-house is getting old, and therefore likely to be a constant source of expense for repairs—it is deemed important to provide for the early erection at this place of a new structure, which should be of the first order. Every facility is offered for the landing and safety of materials, with deep water close up to the bank, and well sheltered.

343. *Head of the Passes*.—The work of building a breakwater in front of this light-house, which was in progress at the date of the last annual report, has been completed, and the good effects anticipated have been fully realized. The current of the river being checked by the piles, a rapid deposition of sediment has taken place, raising the ground between one and two feet during the year. A growth of willow is springing up, which will still further increase the deposition, and it seems reasonable to expect that by these means the stability of the light-house will be assured.

344. *Southwest Pass*.—The old light-house remains in the same condition as was reported last year, but the site is being rapidly encroached upon from the west by the wash of the sea. Some slight repairs have been made during the year. An appropriation is available for the construction of a new light-house at this place, and the subject has received the careful consideration of the Board; but in view of the difficulty of securing an adequate foundation no definite conclusion has been arrived at.

Barrataria bay.—In good condition.

345. *Timbalier bay*.—In the last annual report the necessity for building a new screw-pile light-house in shoal water, inside the island, was urged. The remarks then made are again called to the attention of the Department.

346. *Ship Shoal*.—In good condition. In October of last year the centre of a severe cyclone passed very near this light-house; the pyramidal sea caused such a vibration of the tower that the oil was thrown out of the reservoirs, and all efforts to relight the lamps were unavailing for six hours. The structure, however, was uninjured. Since the application of coal-tar for painting the tower, in order to ameliorate the dreadful sanitary condition of the station, the health of the keepers has been uninterruptedly good, and there can no longer be any doubt that the red-lead paint, with which the structure was painted, washing into the rain-water tanks was the cause of the sickness.

347. *Southwest Reef*.—This screw-pile structure was much damaged by the hurricane of October, 1867. The necessary repairs were promptly commenced, and are now in active progress. The chief features of the work consist in levelling and straightening the screw-piles, adapting the diagonal tension braces in the direction of southeast to northwest—the direction of prevailing and damaging winds. There were no braces previously—a very serious omission in so exposed a structure. A new gal-

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lery of boiler-plate, on wrought-iron girders, on two sides of the structure, is now nearly finished. The interior was repaired, nearly all the wood-work of the tower having been broken up.

348. *Shell Keys*.—This structure was entirely destroyed in the hurricane of 1867, and has not been rebuilt—the appropriation asked for at the last session of Congress not having been granted. The absence of this light is very much felt by vessels trading between Berwick's bay and the Texas coast, and its early reconstruction is strongly recommended.

Calcasieu.—Among the few inlets on the Gulf coast west of the Mississippi, the bay of Calcasieu, some years before the war, acquired considerable importance on account of the extensive lumber trade carried on in that bay and in the river of the same name. This business has much increased since the close of the war, and bids fair to assume very large proportions. The depth of water on the bar is about six feet. The soil bordering the entrance is low salt marsh, subject to inundation during heavy gales.

349. *Sabine Pass*.—In good condition.

350. *Bolivar Point*.—Though the present temporary structure, with 4th order lens, suffices for the present necessities of the harbor of Galveston, yet the importance of the Texas trade seems to require that a permanent structure be erected. The third order iron tower, which was totally destroyed during the war, was found in every respect satisfactory for the exhibition of a light powerful enough for the locality, and the reconstruction of a similar tower and illuminating apparatus is recommended. An estimate of appropriation required will be submitted.

Bolivar beacon.—This structure was destroyed during the war. It was situated on a reef nearly awash in ordinary high tides, running parallel to the beach and 200 or 300 yards distant from it. It is highly probable that the exposed position of this beacon prevented its being lit when most wanted. As it only served for a range with the principal light, the necessity or expediency of its re-establishment will depend upon the location assigned to the main light.

351. *Pelican Spit*.—The necessity for re-establishing these range lights can only be decided upon after examination of the recent work of the coast survey. At all events the simplest contrivances will answer the purpose if it be determined to re-establish the range.

352. *Galveston range beacon*.—The remarks made in the case of Pelican Spit apply equally to this station.

353. *Half-moon shoal*.—The exigencies of the service have prevented any steps toward re-establishing this station, beyond ascertaining its condition.

354. *Red-fish bar*.—Of this structure the iron screw piles only remained, the rest having been burned during the war. A force was sent there in July last with the necessary materials, and the reconstruction of the light-house is progressing rapidly. The lantern is nearly finished and will shortly be sent down. It is expected that the work will be completed in about a month. A temporary light was established May 8, 1868.

355. *Clopper's bar*.—This light-house escaped destruction, though discontinued during the war. A temporary light-house was established and the light exhibited May 8, 1868. The station is in a satisfactory condition except that it needs painting, which will be attended to in a few weeks.

356. *Matagorda*.—The broken sections of this iron tower have been re-cast and are now ready for shipment. The work of putting up the tower is at present delayed in consequence of the undetermined state of the negotiations with the authorities of the State of Texas for the sale

and cession of a new site, the old one having been rendered valueless by the encroachment of the sea, which at the present time is nearly up to the spot formerly occupied. There is, however, a good prospect of an early and favorable action on the application for a new site, when there need be no further delay in the completion of the work.

357. *Salurià*.—This structure was entirely destroyed during the war, and there seems to be no very pressing necessity for its immediate reconstruction.

358. *Half-moon reef*.—This structure has been thoroughly repaired, and the light re-exhibited on the evening of February 20, 1868. The station is now in perfect order.

359. *Swash*.—Of the former structure only the screw-piles of iron remain, and which will answer for a new superstructure, an estimate of the cost of which will be submitted.

360. *Aransas Pass*.—In good condition.

361. *Brazos Island beacon*.—In good condition.

362. *Point Isabel*.—In good condition.

UNLIGHTED BEACONS.

Pass à l'Outre.—This beacon is a triangular skeleton pyramid of wood, constructed in 1863. It is topped with a circle of open slat-work, about eight feet in diameter. Although of simple and cheap construction, it has lasted well considering that very severe gales have visited the locality since its establishment. The structure is 45 feet high, and forms a range with the light-house for crossing the bar in the best water. Two similar structures about 30 feet high are on hand at the depot and await application.

Galveston.—This beacon is an iron screw-pile structure near the outer edge of the bar. It was constructed prior to 1853. It is about 20 feet above the surface of the water and forms a very conspicuous and useful sea-mark. Nothing has been done to it since its original construction, and it bids fair to last for many years more.

BUOYS.

The buoyage of the district has received especial attention and is now in as good condition as at any time before the war, with the exception of St. Andrew's bay and the South Pass of Cat island, which have not yet been buoyed.

A buoy which had been adrift was picked up and brought to New Orleans. An examination disclosed the fact that it did not belong to the United States light-house establishment, and that it was of English manufacture. The facts have been stated to the Department in a special communication, with a view to ascertain the ownership of the buoy and its return accordingly.

TENDERS.

The steam tender *Geranium* has been almost constantly occupied during the past year in placing, changing, and painting bouys, and has moreover performed occasional and valuable service in the engineering branch.

Notwithstanding the smallness of this steamer, the defects in her hull and boiler, she has performed a vast deal of service, and has demonstrated the advantage of steam over sailing vessels for buoy duty.

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Her boiler was repaired in May last, at an expense of \$1,547 80, and the total cost of all repairs to her hull, boiler and machinery during the year amounted to \$2,509 03. :

The inspector reports that the present condition of this vessel is by no means satisfactory; her hull being very weak, bends up fore and aft when in a sea-way, and her boiler cannot be considered safe with a pressure exceeding 22 pounds to the square inch. She is next to unseaworthy, and another vessel should be substituted for her as soon as possible. This vessel was purchased from the Navy Department at the close of the late war. An estimate of the appropriation required to provide a new vessel is submitted.

The schooner *Florida* has been used during the past year in transporting men and materials to the several stations undergoing repairs. Both masts have been renewed; some rotten timbers have been discovered in her and will require repair. The vessel not having been hauled out for about four years, it is desirable to do so at an early day, and at that opportunity make such repairs as may be required. Her sails are about half worn out and may last another year.

The launch *Susan* was thoroughly repaired during the past year, and is in very good condition. The dingey belonging to her, and which was saved from the wreck of the tender *Chaos*, 1866, is nearly worn out and not worth repairs. A new one is required.

The launch *Pharos* requires some repairs, which have been authorized.

Both of these launches have done excellent service during the past year in carrying materials and workmen and in attending upon stations. Their great efficiency was so evident that the construction of a third vessel has been commenced and is now near completion.

DEPOTS.

Depot at the Head of the passes.—A substantial wharf was built last year, and is in excellent condition. From a flat-boat loaded with coal, purchased last year, planks were obtained for building a fence around the coal pile and laying a platform. The buildings consist of an enclosed shed, 20 feet by 40 feet, and an old small tool-house built in 1862. The necessity which exists for suitably extending this depot by the construction of proper buildings and accessories, which was reported in the last annual report, still exists, and the estimate of last year is again submitted.

TENTH DISTRICT.

Extending from the north of the St. Regis river to include the Grassy Island light-house, in Detroit river. There are in this district—

Light-houses and lighted beacons.....	44
Light-vessels.....	None.
Beacons unlighted.....	None.
Buoys actually in position.....	69
Spare buoys to supply losses.....	21
Tenders, steam.....	1

One steam tender, the *Haze*, is common to the tenth and eleventh districts, and is also used by the engineer of those districts after the light stations have been inspected and supplied.

LIGHT STATIONS.

The numbering of stations is according to the light-house list for the lakes, January 1, 1867.

St. Ogdensburg.—The keeper's dwelling is not sufficiently above the

level of the river; when the waters are high the floors are damp. Repairs are required to the roof, which leaks, and the plastering, which is falling.

12. *Crossover island*.—Balcony of lantern leaks badly in several places. The chimneys of the dwelling require rebuilding, above the roof. Outside shutters to the windows are recommended, on account of the exposed position of the dwelling. This building requires repairs, having been constructed of that inferior material known as "soft brick," portions of which have fallen out in many places.

The wood-shed adjoining the keeper's dwelling also requires repair.

There is no boat shed, which, in point of economy, is indispensable.

Sisters' islands, St. Lawrence river.—No progress has been made in establishing the beacon at this point since the last annual report. The papers for perfecting the title of the site are still in the hands of the district attorney.

13. *Sunken Rock*.—In progress, painting of tower and lantern. A new boat, to supply the place of one damaged beyond repair.

14. *Rock island*.—New steps to the front entrance of the keeper's dwelling have been ordered.

15. *Tibbett's Point*.—At this station the roof of the keeper's dwelling, which leaks, the barn, and the plastering of the brick belt on which the lantern rests, require repair. Ventilators are much needed for the lantern, which sweats continually.

16. *Galloo island*.—Repairs to the roof and replastering inside are required for the old dwelling occupied by the assistant keeper; the barn to be entirely reshingled. A boat-house is needed.

17. *Horse island*.—The roof leaks and the plastering is off of the keeper's dwelling in many places. The barn and out-houses are in a dilapidated condition. A small boat-house is required.

18. *Stony Point*.—The dwelling, tower, and out-houses are very old, and considered not worthy of repair. New buildings are recommended.

19. *Oswego*.—At this station the authorized change of light from a fourth order fixed to a third order fixed is in progress. The deck plate and lantern are nearly completed, and other materials are being collected; it is not expected, however, that the cut stone can be obtained in time to finish the work before the close of navigation. The keeper's dwelling is reported as requiring considerable, and the cistern and fences slight repairs; the well has partly caved in, and is useless in its present condition. A new boat is required.

20. *Big Sodus bay*.—New range light lanterns have been put in the place of old ones, which were broken.

The keeper's dwelling is of stone, and the walls apparently good; the walls require furring and replastering. A new roof is recommended by the inspector of the district.

The tower, also of stone, leaks and is very damp.

21. *Genesee*.—Authority has been given to rebuild the walk from the shore to the beacon, which stands at the end of the West Harbor pier, which work will be finished before the close of navigation.

22. *Niagara Fort*.—The wooden tower stands in the old block-house now used for officers' quarters, and is so old and out of repair as to let in the snow and rain in stormy weather. Last winter the roof of the building took fire from a spark from one of the four chimneys which surround the tower. The danger of having the valuable lens destroyed by an accident of this kind, and the inconvenience of using the stairway and passages of the officers' quarters as a thoroughfare for the supply of

the light, make it expedient to erect a new tower, (the old one not being worth repairing,) in a safer and more convenient position.

The floors and plastering of the keeper's dwelling and the fences require repair. The barn is in a ruinous state, and should be removed or rebuilt.

23. *Black Rock beacon*.—In very good order, requiring nothing.

24. *Horse-shoe beacon*.—The pier for the protection of this beacon was begun last fall, but, owing to the inclemency of the weather, had to be suspended. It was resumed this summer, and is now complete. Slight repairs of the flooring of the balcony and the floor and ceiling of the oil-room are required.

25. *Buffalo*.—Slight repairs are needed to the fences.

26. *Dunkirk*.—The keeper's dwelling leaks and the plastering is out of order. The roof leaks and the sills of the covered way which connects the dwelling with the tower are rotten. The main tower is cracked, and the fence enclosing a portion of the grounds is of indifferent quality. The beacon tower is decayed and leaks. The alterations and improvements in progress at Dunkirk, under the direction of the engineer department of the army, afford an appropriate occasion for renovating and perfecting the aids to navigation at this station.

27. *Presque Isle, (Erie)*.—The new tower authorized to be built at this station was finished in the autumn of 1867, but casually omitted in the last annual report. The plastering of the dwelling house inside needs repair, also the window frames and other wood-work.

Presque Isle beacon.—The iron tower needs painting; the roof of the keeper's dwelling, which leaks, requires repair; the house, painting and whitewashing.

28. *Conneaut beacon*.—No repairs of importance have been made or required.

29. *Ashtabula*.—Station in good working order; no repairs made during the past year, and none required for the coming season.

30. *Grand River*.—The light-house at this station is a duplicate of the tower at Presque Isle, Erie, Pennsylvania, which being in a dangerous condition was taken down and rebuilt in 1867. The soil at both stations is of the same nature, and the Grand River tower in about the same condition that the tower at Erie (station No. 27) was found in by the committee of the Light-house Board who examined it. Iron bands have been resorted to to hold the tower together, one of which, unable to withstand the heavy strain put upon it, has fallen off. The keeper's dwelling, built in 1825, is in a very dilapidated condition.

Estimates are submitted for rebuilding the tower, like that recently erected at station No. 27, and a suitable keeper's dwelling. A railing is required on the pier to enable the keeper to reach the beacon in bad weather, in order to light it.

31. *Cleveland*.—Station in order.

At Cleveland beacon a change of light from a sixth order, white, fixed, to a fifth order, fixed, varied by red flashes, has been authorized and will be made as soon as the lens is received.

32. *Black River*.—The tower, which was built of brick of inferior quality, is cracked, owing to the action of the waves on the crib-work. It is proposed to make the necessary repairs in both.

33. *Vermillion beacon*.—The tower, a small structure of wood, has been forced out of perpendicular by the action of the waves in gales of wind and requires repair.

34. *Huron beacon*.—A proper store-room for the supplies is required for this station.

35. *Cedar Point beacon*.—In good condition.

36. *Cedar Point range*.—In good condition.

37. *Sandusky*.—Repair of plastering of keeper's dwelling has been authorized; a store-room for wicks, chimneys, paints and oils, is required. These articles are now kept in the kitchen.

38. *Port Clinton*.—Repairs are required to the tower, which leaks. A well or cistern, slight repairs to the plastering of the keeper's dwelling, thorough repair of fences.

39. *Green island*.—Some slight repairs required to the plastering of the walls inside.

40. *West Sister*.—The tower at this station has been renovated and the keeper's dwelling rebuilt.

41. *Turtle island*.—A new tower and keeper's dwelling, of Milwaukee brick, were finished last year, but not included in the annual report for 1867.

New Maumee ranges.—Three sets of ranges for the navigation of Maumee bay and river have been erected, and will be lighted before the close of the season.

42. *Monroe*.—The wooden tower requires repainting. The lantern (of the old pattern) leaks in the roof and around the base. The deck leaks also. There is no covered passage between the tower and dwelling, though close to each other.

The dwelling, also of wood, needs extensive repairs; the planking of the pier to be removed. An estimate of the cost of putting this station in proper repair is submitted.

43. *Gibraltar*.—Extensive repairs are reported as necessary at this station. The tower leaks, and it is with difficulty that the main door of the tower can be opened, the pressure above the sill having caused it to settle. The lantern leaks, and lantern doors do not close tightly. The roof of the dwelling leaks, and the house is thoroughly wet in rainy weather. The ceilings need replastering. Fences and well are out of order.

44. *Mamajuda*.—In very good condition.

45. *Grassy island*.—The house and tower of this station are of wood and stand upon a pile foundation on a shoal in Detroit river. The roof of the dwelling is in a very leaky condition, in consequence of which much of the plastering has fallen off. The tower and dwelling require painting inside and out. The lantern, of the old pattern, should be replaced by a fifth order lantern of modern style. An estimate of the cost of the necessary repair and improvements is submitted.

BEACONS, (UNLIGHTED.)

None.

BUOYS ACTUALLY IN POSITION.

There has been no change in the buoyage of the 10th district since the last annual report; the system has elicited no complaint, and the service, under contract, has been performed in a satisfactory manner. The buoys in position, as well as "spare," are in serviceable condition.

TENDERS.

The steam tender *Haze*, after supplying the 10th district, was turned over to the inspector of the 11th district.

As an evidence of the superior efficiency of a tender like the *Haze*, whose engine occupies a comparatively small space, and is very economical in the consumption of fuel, it is worthy of record that this vessel visited and supplied every station on Lake Erie in five days, and the whole district in three weeks, including the delay in passing the Welland canal.

ELEVENTH DISTRICT.

The eleventh district includes all of the lake region above Grassy Island light-house, Detroit river. There are in the district—

Light-houses and lighted beacons.....	69
Light-vessels.....	None.
Beacons (unlighted).....	1
Buoys actually in position.....	94
Spare buoys to supply losses.....	38
Tenders (steam, common to 10th and 11th districts).....	1
Tenders (sailing, upon Waugoshance works).....	1

The operations in the district during the past year, and those proposed for the next fiscal year, are as follows: The numbering of the stations is, according to the light-house list for the lakes, 1st January, 1868—

46. *Windmill Point*.—Is in good condition.

47. *St. Clair flats and beacon*.—The crib-work on which the structures are situated needs some minor repairs; also the plastering of the dwelling, and the boat.

It is probable that the new channel across the flats, now being dredged under the direction of the engineer department of the army, will be completed by the close of navigation of 1869; and it is proposed to commence the construction of range lights to mark it, under the appropriation of \$60,000 now available for the purpose, sufficiently early next season to secure their completion by the time the channel can be used.

48. *Fort Gratiot*.—The change of the distinctive characteristics of this light from fixed to fixed varied by flashes, made necessary a flue for the descending weight of the revolving machinery, and it was constructed. The tower is in good condition, except a small leak at the base of the lantern. The dwelling is quite old, but in tolerable repair. A fence to enclose the premises is needed.

An additional coast light between *Fort Gratiot* and *Point aux Barques*, *Lake Huron*, is very much needed. The distance between the two places is 75 miles, for the whole of which vessels keep the shore well aboard while going in either direction.

An estimate of the probable cost of such a structure as is required is submitted.

49. *Point aux Barques*.—The buildings at this station are in fair condition, and will probably require no repairs during the coming season. As reported last year, the trees on a point to the southward and eastward interfere with the range of the light in that direction.

50. *Tawas (Ottawa) Point*.—It has not been found practicable to make the repairs which last year were reported as necessary, and the condition of the station is not improved.

51. *Charity island*.—In the keeper's dwelling the plastering has fallen in many places, and, together with the kitchen floor, requires repairing. New sails and oars for the boat, and blocks and falls for hauling it out of the water, are needed.

52. *Saginaw bay*.—The station is in fair condition. Nothing is required for the tower. The dwelling is old, but can be made comfortable for some time yet by repairing the plastering, which has fallen in many places, refitting the doors, which now fit badly and permit storms to beat in and injure the floors, and renewing the floor in one of the rooms.

The boat requires repairing and calking, and new sails and oars.

Sturgeon Point.—An appropriation of \$15,000 for the construction of a light-house at this point is available. The land needed for the site has

been purchased, and the title-papers are now in the hands of the United States district attorney for examination, preliminary to submitting them to the Attorney General for his opinion concerning the validity of the title proposed to be conveyed to the United States.

Trowbridge Point, (Alpena.)—By act of Congress, approved July 20, 1868, the Board was authorized to change the site formerly proposed for this light-house. The proper site is at the mouth of Thunder Bay river, the entrance to which will thus be marked, and the station subserve a much better purpose than it would on Trowbridge Point, a mile distant.

A company, chartered under the laws of the State of Michigan, is now engaged in building piers at the mouth of Thunder Bay river, and if the works are properly constructed, and the right of way can be secured, the best place for the light will be at the end of one of the piers, where it will answer both as a guide into Thunder bay and into the mouth of the river to the town and harbor of Alpena. A dwelling on shore will have to be built for the keeper.

It is proposed to wait until the piers referred to are completed, before any further steps are taken in the matter.

53. *Thunder Bay island.*—The dwelling at this station has been entirely rebuilt since the last annual report, the cost thereof being borne by the appropriation approved March 2, 1867, specially applicable to the work. The station is now in good condition.

54. *Presque Isle.*—The appropriation, approved March 2, 1867, for rebuilding the keeper's dwelling has not been expended. After due consideration of the subject, it was determined to recommend the removal of this light to a site about one mile north of the present one, so as to make it answer the purposes of a much needed coast light, instead of being a mere harbor light as it now is. Owing to the character of the entrance to the harbor, the light is of little value to guide vessels into it. If the removal of the light is made as contemplated, its power must be increased, which involves the necessity for an additional appropriation, which should also provide for the establishment of range lights to guide into the harbor. With the arrangement now proposed, this fine harbor of refuge will become available, and the requirements of commerce for a coast light on the point of the peninsula will be at the same time fully met.

Spectacle reef is a very dangerous shoal in Lake Huron, ten miles to the eastward of Bois Blanc light-house. It is in the way of all vessels beating through Lake Huron, and is probably more dreaded by navigators than any other danger now unmarked throughout the entire chain of lakes, and a light-house there would be scarcely second in importance to Waungoshance. The Board has recently authorized placing a buoy of the first class upon it. But this, of course, is of use only in the daytime. The reef is composed of boulders, and is exposed to the whole sweep of Lake Huron; therefore, the construction of a light-house upon it would be both difficult and expensive. It would cost probably not less than three hundred thousand dollars to build a proper structure. Large as this sum is, the wreck upon it last fall of two vessels at one time involved a loss greater than required to mark the danger, and it is not unlikely that the aggregate of all the losses which have occurred here would build several such light-houses. In view of the great commerce upon the lakes, and its prospective increase, the Board feels that they are justified in now bringing the matter to the attention of Congress, and in submitting an estimate for an appropriation to begin the work.

55. *Bois Blanc.*—The new tower and dwelling in course of construction

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at the date of the last annual report was completed and lighted as expected. The station is now in excellent condition.

56. *Cheboygan*.—The necessary repairs to the foundation of the building have been made, but it requires protection by paving or sodding to prevent the sand again drifting from under it. Otherwise the station is in good condition.

Straits of Mackinac.—Attention is respectfully directed to remarks in the last annual report concerning the necessity of a light to mark the passage between the island of Mackinac and Round island, known as the North Channel, and the estimate then made is renewed.

57. *Detour*.—Nothing required, the station being in good condition.

McGulpin's Point.—A valid title to the requisite site for a light-house at this point having been vested in the United States by the proceedings in condemnation, last year reported as in progress, the work was commenced this season, and it is expected that the light will be shown for the first time on or before the 15th November, 1868.

58. *Waugoshance*.—It was necessary at the close of operations last season to leave the work of excavation for the face wall of the new pier of protection at this station in a somewhat critical condition. The excavation had been carried down through the old crib-work, and to a depth of six and a half feet below the surface of the water. However, every precaution was taken, the iron dam being filled with water and well shored to the surrounding pier, and the machinery being entirely covered in with timber and plank. A reliable man was left in charge, who remained there during the winter, and early in the spring made the gratifying report that nothing at the station had been injured by the ice and gales of the season. At that time a portion of the pier was still covered with piles of ice twenty feet in thickness, but one of the air locks of the dam was free, and there was but little ice on the engine room, and none inside of it, so that the work of setting up the machinery and getting ready for this season's operations could be at once begun. One month was consumed in this preliminary work, and in erecting a derrick of sufficient power to handle the heavy stone to be laid in the wall. A portion of time was also devoted to strengthening the dam by putting a large number of stay braces in the space occupied by the two upper courses of the boiler iron composing it. These were to prevent the springing of the dam under the heavy load (nearly seven hundred pounds to the square foot) to which it was subjected while being sunk as the excavation proceeded.

Meanwhile a force of stonecutters was organized at Marblehead, Ohio, for the purpose of cutting that portion of the stone which had been contracted for in the rough, and comprising all the even-numbered courses in the wall. The odd-numbered courses had been contracted for to be cut to the net dimensions by the contractors; and all were to be delivered at Waugoshance pier by the contractors free of expense to the United States.

On the 23d of May, everything being in readiness, the operation of sinking the dam was resumed, and, from this time until the 20th of June, was continued both night and day. The material excavated consisted of limestone and granitic boulders, packed in sand and gravel. Some of these boulders weighed from three to four tons each, and were situated partly within and partly without the dam. Such had to be either undermined and drawn into the dam, or drilled and split, to allow the dam to pass them in sinking. As the stones were excavated from the bottom, they were deposited upon the top of the dam in timber cribs built to receive them, and by their weight assisted in sinking it. During

the process of excavation, nearly three times the cubic contents of the material displaced by the dam were removed, this great excess arising from the materials which either fell in from the outside, or were drawn in to make way for the dam. At one time the dam became so tightly jammed by the pressure against it of the boulders on the outside that it was necessary to raise it to permit the stones and gravel to roll inwards, and afterwards pass them out through the air-locks.

The excavation continued until the evening of the 20th June, when it was stopped at the depth below the water surface of twelve feet two inches. From the bottom of the excavation at this depth, holes were sunk three feet deeper into the reef without finding rock in place. The material reached (boulders, gravel, and sand) was so compact that it was with difficulty it could be broken up with crowbars, and it was finally determined to carry the excavation no further.

The bed-rock is in full view on three sides of the pier, and distant from it only a couple of hundred feet, at a depth of 10 feet below the surface of the water. Not finding bed-rock at the exact site of the tower, at 15 feet below the water surface, it is inferred that the tower stands upon a reef which has formed within the horseshoe-like rock seen from the pier.

As bed-rock had not been reached, the difficulty of making a cement bottom for the dam, which would be capable of resisting the buoyant effort of the water when the dam was opened to the external air, was greatly increased. To distribute this buoyant effort equally over the whole bottom, a floor was made of Norway pine plank, six inches in thickness, laid as closely together as possible, and extending beyond the sides of the dam all around to a distance of three inches. This floor was completed on the 3d of July, and, between that time and the close of the month, the workmen were engaged in filling in with concrete the space between the dam and the foundation of the tower, and in building a railway around the dam, so as to distribute the stone for the wall by means of a truck.

During the months of August and September repeated attempts were made to close the bottom of the dam with cement and concrete. Twice the bottom was made so strong that it stood until the pressure underneath it was within one pound to the square inch of that required, and each time it failed. A large valve was then cut in the top of the dam, and a few stone for the bottom course passed through it into the dam, then full of water. Air was then forced into the dam until the water was expelled, and afterwards the stone were laid in their places. More stone were then passed through the valve and laid in the same way. The work is now progressing finely, and it is expected that two entire courses of stone will be laid before operations are suspended for the winter.

It is hoped that next season will be sufficient for the entire completion of this very important work.

St. Helena island.—For the reasons given in the last annual report a light to mark the anchorage at this island is deemed necessary, and the estimate then submitted is respectfully renewed.

59. *Skullagalee*, (Isle au Galets.)—The work of rebuilding and improving this light station, suspended at the close of last season, was resumed in the spring, and has been completed. Formerly a light of the sixth order was exhibited from a height of 35 feet. Since the 19th of July last a light of the third order, elevated 106 feet above the water, marks this station. The improvement was greatly needed and has already proven of great benefit to navigators.

60. *Beaver Island harbor*.—An appropriation of \$5,000 approved July 20, 1868, for repairs and renovations at this station, is available. In addition to the thorough renovation of the dwelling, it may possibly be necessary to rebuild the tower and supply it with a new deck plate and lantern. It is proposed to make the necessary renovations and improvements during the course of next season.

61. *Beaver island*.—The tower and dwelling are in good repair, except that some of the shutters have been blown off the dwelling. They should be replaced, and a good cistern should be built.

62. *South Fox island*.—This station is new and in good condition. The inside of the dwelling and the iron stairway of the tower require painting.

63. *Grand Traverse*.—Tower and dwelling in good condition; a boat house and ways are required.

Mission Point—the point dividing Grand Traverse bay. An appropriation of \$6,000, approved March 3, 1859, is available for building a light-house upon this point. The necessity for the construction of the light-house never having been at all urgent, the money has not been expended. Further examination into the matter will be made, and if it does not appear that the station is required the appropriation will be transferred to the surplus fund.

64. *South Manitou island*.—This station requires extensive repairs. The house is of brick, surmounted by a wooden tower. New plastering is required throughout, as well as painting. New eaves troughs and conductors are needed, also a new cistern. The house which protects the fog signal is in bad condition and requires general repairs. An estimate of the probable cost of putting the station in good condition is submitted.

65. *Point Betsey*.—This station is greatly in need of repairs; the plastering has fallen in many places, and the floors are considerably decayed. Some of the foundation stones of the tower have become displaced; they should be replaced and the entire foundation repointed.

66. *Grand Point au Sable*.—This station is new and in good condition. The drifting of the sand threatens the stability of the tower.

Manistee.—The requisite site has been purchased, and the title approved by the Attorney General. It is proposed to build the light-house during next season.

White river.—The harbor works at this place are not yet sufficiently advanced to warrant a final decision concerning the character of the requisite buildings and their exact site.

67. *Muskegon*.—An appropriation of \$8,000 approved March 2, 1867 "for rebuilding keeper's dwelling at Muskegon light station," is available. As the light was exhibited from the keeper's dwelling, the rebuilding of the latter involved the necessity of rebuilding the whole station. Plans for a structure of wood were prepared, as none other could be built for the amount of the appropriation, and early in the last spring the work was commenced. A temporary building was erected from which the light was exhibited; the old buildings were taken down and the timber framed for the new building. At this stage, it was represented that a frame building upon the old site would be exposed to great danger of fire from piles of combustibles (lumber, slabs, sawdust and shavings) which surround it. It was found upon examination that these representations were well founded, and, moreover, that the lake front of the site was possessed by the United States, and that the description of the site as given in the deed was very indefinite. The work was consequently suspended and steps taken to secure a proper site on the north side of the river.

One of the owners of this site being absent from the country, nothing further can be done in the matter until his return, which is expected at an early day.

Because of the close proximity of so much that will readily take fire, the new building ought to be as near fire-proof as circumstances will permit, and in order to make it so a small appropriation in addition to the former one is required.

68. *Grand river*.—This light station has been put in thorough repair; the tower has been raised four feet and provided with a new lantern, for which a special appropriation has been made, approved March 2, 1867.

South Haven.—The south pier at this harbor is now completed and a light similar to the one established on Kenosha pier should be placed upon it. It is proposed to purchase the necessary site for a keeper's dwelling in time to begin the construction of the buildings during next season.

69. *Kalamazoo*.—The station and all about it are in good condition.

70. *St. Joseph's and beacon*.—The light-house at this station consists of a wooden dwelling surmounted by a wooden tower. They require repainting, and the cellar needs draining. A cistern is wanted, and the house should be provided with eaves gutters and conductors. A new fence is required.

71. *Michigan City*.—The dwelling leaks badly where the tower joins the roof; eaves troughs and conductors are needed; the roof requires repairs, and a cistern and new outbuildings are wanted.

72. *Chicago*.—This station is in good condition so far as repairs are concerned. A cistern is needed and will be built.

73. *Waukegan*.—New outbuildings and repairs to roof of dwelling and to the cistern and well are required, and a pump is wanted for the latter.

74. *Kenosha and beacon*.—This station is in excellent condition in every respect.

75. *Racine*.—It is proposed to put into this light-house a new lens, illuminating 225° of the horizon, instead of 180° , as at present.

76. *Milwaukee*.—This station has been put in thorough repair. The tower has been raised four feet and supplied with a new and improved lantern, much to the benefit of those for whose use it is intended.

77. *North Cut beacon*.—The tower and dwelling are in good condition.

78. *Port Washington*.—In good condition; small repairs have been made to the cistern and well.

79. *Sheboygan*.—After some slight repairs to the cistern and fence have been made, the station will be in good condition.

80. *Manitowoc*.—Tower old, but in fair condition. The dwelling requires general repairs.

81. *Bayley's harbor*.—By act of Congress, approved March 2, 1867, the sum of \$15,000 was appropriated for "repairs and renovations" at this station. Upon examination it was deemed best not to expend this money at Bayley's harbor, but to remove the light to Cana island, a short distance to the northward, and making it a lake coast light, and to build range lights to mark the channel into Bayley's harbor. Upon making his apparent to Congress the requisite authority for the change was given.

Bayley's harbor range lights.—An appropriation of \$6,000 for range lights to mark the entrance to and channel into the harbor has been made and the title to the land required for the sites has been vested in the United States. The work will be commenced upon the opening of next season, and before its close this fine harbor of refuge will be made available, which has never before been the case.

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Cana island.—Under authority of a provision of the act of Congress approved July 20, 1868, the light heretofore located on the island at the entrance to Bayley's harbor is to be removed to Cana island. At the position proposed will give to the new light much greater importance and make it a lake coast light, it should be increased from the fifth order to the third to correspond with the other lake coast lights. This increase of power and efficiency will, of course, cause an increase of cost, and an estimate of the amount which will be required in addition to the \$15,000 now available is submitted.

North bay.—This excellent harbor of refuge, situated to the northward of Cana island, is now without a light. To render it available a single set of range lights, of inexpensive character, is required, and an estimate of the cost thereof is submitted. With these ranges, taken in connection with the coast light on Cana island and the ranges for Bayley's harbor, this portion of the coast of Lake Michigan, now so much dreaded in stormy weather, will be made almost perfectly safe.

82. *Port du Morts.*—The dwelling requires replastering and painting. The tower and fog-signal house also require painting. The fire-clay lining to the furnace of the engine, which operates the fog signal, needs renewing.

83. *Pottawatonic.*—Tower and dwelling in good condition. Nothing required, except some trifling repairs to the plastering of the dwelling.

Poverty island.—The recommendation and estimates for a light-house on Poverty island, northern entrance to Green bay, contained in the report of last year, is, for the reasons there given, respectfully renewed.

84. *Point Peninsula.*—The front wall of the dwelling is cracked, and the cellar is wet. When these are attended to and corrected the station will be in good condition.

85. *Escanaba.*—The light at this new station was exhibited, as expected at the date of the last annual report.

Chambers's island, (Manomah.)—This new light station was complete during the season, and the light exhibited for the first time on the night of October 1st.

86. *Green island.*—In good condition. Some small supplies for the boat are needed.

Eagle bluff.—This light station (a new one) was entirely constructed during the season, and a light was exhibited from it for the first time on the night of October 15, 1868.

87. *Tail Point.*—This station is in good condition.

Fox river.—By acts of Congress approved July 2, 1864, and April 1866, the sum of \$11,000 is available for the purpose of building a beacon light at the mouth of Fox river. A cut is now being dredged through Grassy island; it is about half done, but work upon it is now suspended. It is understood, for want of funds. There is now sufficient water in the cut to permit steamers of light draught to pass through. It is recommended that no steps be taken toward lighting this channel until its completion, and that no attempts be made to light the old channel which are crooked, and would be difficult to light satisfactorily.

88. *Round island.*—This station is in such a condition that it probably requires rebuilding, but the question cannot be definitely determined until a more thorough examination is made. Meanwhile, it is proposed to make such temporary repairs as are required.

89. *Point Iroquois.*—The condition of this station is such that it may possibly require rebuilding, a question which must remain in doubt until the structures are examined by competent persons. The necessary repairs of a temporary nature will meanwhile be made.

90. *White Fish Point*.—Tower and illuminating apparatus are in excellent condition. Slight repairs are required to the plastering of the dwelling, and a cistern and cellar are much needed.

A coast light between White Fish Point and Grand Island harbor, Lake Superior.—Attention is respectfully directed to the recommendation concerning and estimate for this work, contained in the annual report of the Board for last year. The necessity for this light is great, and the recommendation and estimate are repeated.

Grand Island harbor, eastern entrance, range lights.—These range lights were completed during this season, and lighted for the first time on the night of the 15th August.

91. *Grand island*.—Tower and dwelling new, and in good condition.

Grand Island harbor, western entrance, range lights.—Were completed during the season, and lighted for the first time on the night of August 15th, 1868.

92. *Marquette*.—Tower and dwelling are in good condition; some repairs to the cistern are required.

Granite island.—By the proceedings in condemnation last year reported in progress, a valid title to the whole island (which only contains a couple of acres) has been vested in the United States, and a working party is now engaged in the construction of the buildings, and it is expected that they will be completed before the close of the season. The landing of the materials at this place was accompanied by more than ordinary difficulty. The island (granite rock) rises almost perpendicularly out of Lake Superior, with deep water all around it. Whatever was landed had to be moved from the steamer to the top of the island, which is sixty feet above the water. At ten feet above the water a platform was erected, from which a track was laid to the summit of the island, where a portable steam engine was placed, for the purpose of hauling up a track upon which all the materials were carried.

The transportation from Detroit, Michigan, of the materials used in the buildings and accessories, was done by the steamer Haze, (belonging to the light-house establishment,) which rendered very valuable service in this way.

Much of the top of the rock had to be removed by blasting, in order to get a suitable place for the light-house buildings.

It will be necessary to construct suitable davits with which to hoist the light-house boat out of the way of the sea.

West Huron island.—The buildings are placed upon the highest part of the island, at an elevation of 163 feet above the lake. The island consists of granite, of which material both the house and the tower are built. A road had to be constructed from the foot of the island to its summit in order to transport the materials used, and the labor involved in the transportation was very great. Large quantities of rock had to be removed, both in constructing the road and in making a level site for the buildings.

The light will be exhibited for the first time on the night of the 20th October, 1868.

93. *Portage river*.—The buildings are in a dilapidated condition, described in detail as follows:

The tower is built of rubble stone, with solid walls which are very damp inside. The stairway is of wood, and badly decayed. The lantern leaks, and is too small for the apparatus, having an inside diameter of only four (4) feet.

The dwelling is also built of rubble stone. During wet weather the water stands on the floor of the cellar, and it is damp at all times. The

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house is very damp throughout, in consequence of which the floors are so badly decayed as to be unsafe. The plastering has fallen off the ceilings and walls in many places. The eaves of the roof do not project beyond the walls.

It is recommended that the tower be provided with an interior brick cylinder, an iron stairway, and a lantern of modern style, with cast-iron deck plate; also, that a new dwelling be built, and that it be connected with the tower by a covered passage-way.

To make these repairs and renovations will require a special appropriation, for which an estimate is submitted.

Portage entry range lights.—These range lights were entirely built this season, and were lighted for the first time on the night of the 1st October, 1868.

Mendota—An appropriation of \$14,000, approved March 2, 1867, is available for the purpose of establishing this light station. The act of Congress making the appropriation for this light-house provides that it shall be built by contract. A site has been purchased, and the title approved by the Attorney General of the United States. It is proposed to place a wooden tower at the end of the south pier, and to erect a keeper's dwelling on shore.

94. *Manitou*.—In good condition, except that the main band encircling the column at the southeast corner of the tower has been cracked by some unknown cause.

95. *Gull Rock*.—This station is new and in good condition.

96. *Copper Harbor*.—Except the cistern, which leaks badly, everything about this station is in good condition.

97. *Copper Harbor range lights*.—Under authority of the act of Congress approved July 20, 1868, appropriating the additional sum of \$5,000 for a range of lights for Copper Harbor, a working party is now engaged in building the dwelling for the keeper of the range lights, rendered necessary by the circumstances detailed in the last annual report. It is expected that the dwelling will be completed before the close of the season.

98. *Eagle Harbor*.—The light-house buildings at this place are in very bad condition, and have been so for several years. The dwelling is built of rubble stone, laid together in the rudest manner. It is surmounted by an octagonal wooden tower, with a lantern of the oldest pattern, having small panes of glass, and heavy sash bars, which obstruct the light.

It is recommended that this station be rebuilt, and an estimate of the cost of doing this is submitted.

99. *Eagle river*.—At this station the buildings are situated on a sand hill, and the tower forms one corner of the dwelling. Owing to the character of the foundation the walls have cracked, and the crack has enlarged materially within the last year, showing that the destructive influences are still at work. The inspector reports that already there is danger that the corner of the dwelling supporting the tower will fall. Either very extensive repairs or a new structure are required, and believing that the latter would prove to be the most economical, an estimate of the cost is submitted.

100. *Ontonagon*.—The buildings at this station are new and in good condition.

101. *La Pointe*.—The work of protecting the foundation of the structure at this place has been somewhat delayed by the failure of the contractor to deliver the stone as agreed upon. Recently, about 50 cords of stone have been delivered, and will at once be broken up and placed. As the piers upon which the building rests extend downwards to the water level, there is no danger that the building will be destroyed.

102. *Raspberry island*.—The dwelling requires replastering throughout and repainting. A boat landing is needed; also steps to lead from the landing to the top of the bluff (40 feet high) upon which the buildings stand. An estimate of the cost of these improvements is submitted.

Michigan island.—During next season it is proposed to renovate and relight this station, in accordance with the provision of the act of Congress approved July 20, 1868.

103. *Minnesota point*.—The tower is in good condition. The dwelling leaks badly around the chimneys. The rain and soot have discolored the walls. The plastering has fallen in many places, and is loose in nearly all the rooms. It is proposed to replaster the house throughout, and to reflash the chimneys.

Beaver bay.—The act of Congress approved July 28, 1866, appropriating \$15,000 for a light-house at this place, contains the following provision, "That the Light-house Board of the Treasury Department, after due examination, shall deem a light-house at that point necessary."

Under instructions from the board, Beaver bay was visited by General William F. Reynolds, corps of engineers, engineer of the district, who, under date of August 19, 1868, submitted a report, the substance of which is as follows:

"The light is not needed for local purposes, nor is it required by the general wants of commerce. Its erection at present could only be justified by the anticipation of trade, which will no doubt spring up in this region of Lake Superior upon the completion of the St. Paul railroad."

The Board does not deem a light-house at that point necessary at present.

Pigeon river.—An appropriation of \$15,000, approved March 2, 1867, is now available for a light-house at this point. By the terms of the act it is provided that the work shall be done by contract. Nothing has yet been done in the matter beyond the selection of the required site. The engineer of the district reports that in his opinion the light-house is not required, and unless otherwise directed the Board, acting upon this opinion, will not establish the light until the more important requirements of the district are attended to.

BEACONS, (UNLIGHTED.)

Stannard's rock.—This day-beacon was erected during the season. It consists of a stone pyramid in the form of a frustum of a right cone of nine feet base; eight feet at the top; composed of three courses of stone, each being two feet in thickness and made up of three stones of equal size. This frustum is capped by one large stone of five feet three inches in diameter, and 21 inches in thickness. To prevent slipping along any of the horizontal joints, offsets are cut in the rock and on each horizontal face of each course, these offsets fitting into corresponding projections on the adjacent stones. For further security all the courses are dowelled to each other and to the rock by iron dowells of five feet in length and two and a half inches in diameter; the lower dowells penetrating the rock to the depth of two feet, and all wedged in place. The stones of each course are also fastened to each other with clamps. A shaft of eight inches in diameter and 18 feet 6 inches in length is stepped through the pyramid, and rests directly upon the rock. It bears at its top a spherical cage of iron six feet in diameter, the centre of the cage being elevated 25 feet above the surface of the water.

This rock, being more than 20 miles from the nearest land, of small area at the surface of the water, and rising only a couple of feet above

it, was awash, even in the most moderate weather, and it was therefore necessary to provide a vessel to serve the purpose of quarters for the workmen and storage for the materials. A steam barge, chartered for the purpose, answered admirably.

A day-beacon on Whale's Back, Green bay.—Near the middle of Green bay is a dangerous reef of boulders, known as Whale's Back, having only one foot of water upon it. It lies nearly in the line of all commerce to and from points at or near the head of the bay, and is much dreaded by navigators.

A beacon should be built upon it, somewhat like that on Stannard's rock, to do which will require a special appropriation of the amount specified in the estimate submitted.

Beacon on Peshtigo shoal.—After the completion of the light-house on Chambers's island, a balance of about \$10,000 will remain from the appropriation, approved July 28, 1866, of \$25,000 for "additional aids to navigation in Green bay, including a light-house on Chambers's island and a beacon on Peshtigo shoal." It is proposed to apply this balance to the purpose intended by Congress, as soon as satisfactory plans have been made, which will probably be in time to secure the completion of the beacon during next season.

BUOYS.

St. Clair flats.—The present channel over the St. Clair flats is marked by 11 spar-buoys, all in good condition. When the channel now being dredged is completed, a new arrangement of the buoys will be required. The buoys are attended to by contract.

Saginaw river.—The entrance to Saginaw river has recently been improved by dredging, and there is now 11 feet of water in the cut. The channel is marked by nine spar-buoys. The buoys are attended to by contract.

Spectacle reef.—After this season this dangerous reef, heretofore unmarked, will be designated by an iron can buoy of the first class, placed in 18 feet water, between the two shoals forming the reef.

Garden city reef.—Upon the opening of navigation next spring a first-class iron can buoy will be placed to designate this shoal, heretofore unmarked. The loss of the steamer "Garden City" upon this shoal gave to it the name by which it is now known.

Graham shoals.—A survey of these shoals has been made, with a view to marking them with buoys of the proper class. The result is now before the Board, and appropriate action will be taken.

Lake Muskegon, Michigan.—Since the last annual report, a change has been made in the buoyage of this place by the discontinuance of the buoy off Pillsbury Point—the channel being sufficiently defined by the booms now there.

Grand river, Michigan.—The completion of the south pier at this place has materially increased the depth of the water in the channel, and has also changed the character of the channel so much as to render unnecessary all the buoys formerly marking it, except a single spar.

Chicago river.—The entrance to this river is designated by one spar buoy.

Racine reef.—An examination of this reef, with a view to properly marking it with buoys, has been made, and the result is now before the Board for consideration.

Reef off Sheboygan.—During the present season a spar buoy has been placed on the north end of this reef, and another on the south end.

Point Peninsula.—During this season two spar buoys have been placed at this point—one to mark the end of the “spit” making off from Point Peninsula, and the other to mark a dangerous spot, having on it 10½ feet water, laying off the point at a distance of about two and a half miles from the light-house.

Sand Point, (Escanaba,) Green bay.—Upon the opening of navigation in the spring, a third-class iron can-buoy, heretofore used to mark Whale's Back, is to be placed at this point.

Whale's Back shoal, Green bay.—During the present season a second-class iron can-buoy has been substituted for the third-class buoy previously marking this shoal. The locality is a dangerous one, and by reference to a previous part of this report it will be seen that the Board has recommended the construction of a beacon, to mark it more distinctly.

Horseshoe reef, Green bay.—During the present season a second-class can-buoy was placed to mark this reef. In one of the recent severe gales the buoy broke from its moorings, and was picked up by the light-keeper at Chambers's island. Steps have been taken to return it to its station.

Peshigo reef, Green bay.—The inspector of the district recommends buoying the seven-foot channel inside the outer end of this reef with four spar buoys. It is proposed during the coming season to build a day-beacon to mark the reef itself.

Green bay entrance to Fox river.—No change has been made in the buoyage at this point. The cut through Green island is somewhat advanced, but is not of sufficient depth or width for the general purposes of commerce. It may be advisable to mark this cut in a manner different from the old channel, (which must be used for a long time yet,) either by piles driven into the ground or some other simple and inexpensive method.

The old channel is now marked by 11 spar buoys, which are attended to by contract.

Sault Ste. Marie river.—The buoyage of this river is now represented by 47 spar buoys and eight stakes. In case the proposed improvement of the West Neebish channel is made, a change in that portion of the buoyage will be required. The buoys are attended to by contract.

TENDERS AND SUPPLY VESSELS.

The steamer *Haze*, which is used as a supply vessel for the entire lake region, and as tender upon such works of construction as may be deemed advisable, left Detroit on the 18th of May last, after taking on the supplies necessary for distribution in the 10th district. After supplying that district, she was turned over to the inspector of the 11th, who placed on board the supplies for his district, and on the 26th of June left Detroit for the purpose of distributing them. This duty being completed, the steamer returned to Detroit on the 5th of August, having up to that time steamed, in the 11th district alone, a distance of nearly 4,000 miles, at an expense of less than \$800 for fuel, and nothing for repairs or delays. In addition to distributing the supplies, she transported and delivered the several sets of illuminating apparatus for the new light stations in process of construction, and was employed, in accordance with the orders of the Board, in examining certain reefs in Lakes Huron and Michigan.

On the 10th of August she was turned over to the engineer of the district, for use in transporting workmen, materials, and supplies for the light-house works in progress under his direction. She was at once despatched

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with a full load for Granite Island light-house, Lake Superior, which she delivered, and then, returning to Lake Huron and proceeding to, Eagle bluff, Green bay, removed the working party which had been engaged upon that light station to McGulpin's Point, Straits of Mackinac; after which she delivered at the same point 20 cords of stone, obtained at Drummond's island. She then returned to Detroit, to again load with materials, &c., for McGulpin's Point. In addition to the points named, she had, up to the 1st of October, also visited the following places, on general duty with reference to the work of the light-house engineer, viz: Thunder bay, Lake Huron, Grand island, Marquette, Huron island, Portage entry, Portage light-house, Lac la Belle and Copper Harbor, Lake Superior; Bois Blanc island, Cheboygan, and Mackinac, in the Straits of Mackinac; Skillagalee, Bayley's harbor, and Cana island, in Lake Michigan; Chambers's island, Whale's Back, and Escanaba, in Green bay. On the 1st of October she was at Milwaukee, loading with brick for McGulpin's Point. It is expected that she will also deliver this season the brick required for Cana island and Presque Isle light-houses.

The sailing tender *Belle* has been constantly in attendance upon the Waugoshance works, transporting materials (except stone) and supplies, as well as serving as quarters for a portion of the force connected with that work. She is a fine vessel of her size, and is in good condition.

TWELFTH DISTRICT,

Embracing the Pacific coast, from the southern boundary of California to the forty-first parallel of latitude. There are in this district—

Light-houses and lighted beacons.....	9
Light-vessels.....	None.
Beacons unlighted.....	None.
Buoys actually in position.....	4
Spare buoys to supply losses.....	Not reported.
Tenders, steam.....	1
Tenders, sailing.....	None.

Reports in relation to the various light-house stations in this district, though not as full as expected, contain the following information:

363. *Point Loma*.—In good condition. A small boat for this station has been ordered.

Point Hueneme—Anacapa island.—These two points, among others on the coast, have been visited by the engineer of the district, for the purpose of selecting the best site for a light-house. For the reasons which follow he gives the preference to Anacapa.

Point Hueneme is at the southern entrance of the Santa Barbara channel, where the direction of the coast changes considerably, and where for more than 10 miles the land is very low—in fact, not much above the level of the sea. The position of the point, therefore, would be good, but for the disadvantages of low ground, drifting sands, and the neighborhood of a number of lagoons, which make it difficult to build and not desirable to live there.

Anacapa island, the eastern end of which is but 12 miles to the southward and westward of Hueneme, is believed to be at that point about 250 feet above the sea, and a light there would not only command the Santa Barbara channel, but the waters to the south, southeast, and southwest of it, with an arc of visibility of nearly 360°. Anacapa is rocky and destitute both of wood and water. Its sides, which are bluff, and the want of a harbor, will make building difficult and expensive there.

These disadvantages, however, are not greater than those which exist at Point Hueneme, while in respect to situation that point is decidedly inferior. It is therefore recommended that instead of a fourth-order light at Point Hueneme, as contemplated, a first or second-order light be established at Anacapa, estimates for which purpose are accordingly submitted. Anacapa island belongs to the general government, while the title to Point Hueneme must be acquired. It is proper to add that the owners of the point have offered to give to the United States a piece of land suitable for a light-house.

364. *Santa Barbara*.—Extensive repairs have been made at this station. In the cellar a new floor has been made of bricks laid on edge in cement, in place of the old floor, which, being composed of bricks laid flat in ordinary mortar, was flooded by heavy rains. A drain leading outside from the cellar floor has also been constructed. A brick chimney has been substituted for the stove-pipe which passed through the roof and was considered unsafe. The tower and chimneys, where they pass through the roof, have been repointed with cement mortar. A storm-house has been built over and in front of the kitchen door, to keep out the rain. Slight repairs to the kitchen have been made.

San Miguel.—A light-house at this island, which is situated at the southern entrance of the channel of Santa Barbara, 35 miles from Point Arguello and 25 from Point Conception, is of immediate importance, and would be especially useful to the Panama steamers and vessels coming up the coast from Mexico. The island has a very commanding position, a good harbor, and though there is no water there in summer, the difficulties of building a light-house there are fewer than those usually encountered on this coast. Estimates for the erection of a suitable light-house on San Miguel are submitted.

365. *Point Conception*.—Some repairs have been made at this station. The cistern, two sides of which were comprised in the walls of the house, would not hold water, those walls being cracked. To make the cistern tight a portion of the brick-work was removed, a new floor laid, and the inside coated with cement plaster. All the cracks in the outer walls have been pointed with cement. The caps and lintels of the doors and windows of the house were found to be rotten, and new ones have been put in. A wood-house and a small stable for a mule and a shed for the cart have been built. The fence around the light-house grounds has been repaired. The light station is now reported in good condition.

366. *Point Pinos*.—No recent account of the condition of this station has been received. The title of the United States to the property on which the light-house at this station is built is in dispute.

Santa Cruz.—An appropriation has been made and the preliminary steps have been taken for establishing a light at this point, which is situated at the northern extremity of the bay of Monterey, opposite Point Pinos. The title has been examined and its validity confirmed, and the work will be taken in hand with as little delay as possible.

Point Año Nuevo.—An appropriation has been made, also, for a first-order light at Point Año Nuevo. The site selected is an island about a quarter of a mile distant from the main land, and has been reserved for light-house purposes by the President of the United States. Nevertheless, the owners of the rancho claim the title to the island to be vested in them. Whenever this question is settled the building will be commenced.

367. *Farrallon*.—At this station a new roof has been put on the keeper's dwelling, and repairs have been made in the gutters and down-pipes leading to the cistern.

368. *Point Bonita*.—When inspected was found to need no repair.

369. *Fort Point*.—During the past year the glass of the lantern has been reset, (the India-rubber in which it was set having become rotten;) the iron tower has been scraped and repainted. The fog-signal structure and machinery, which were badly damaged by the salute fired on the 4th of July last, have been repaired. Application has been made in the proper quarter to prevent the recurrence of this accident.

370. *Alcatraz*.—On examining this station quite extensive repairs were found necessary, and have been accordingly made, viz: The gallery floor and its iron fastening have been taken up; the brick-work of the tower, from where it passes through the roof of the keeper's dwelling, has been repointed; a coat of cement has been given to the coping of the tower; a new gallery floor has been laid; the boiler iron covering of the lower part of the lantern has been removed, straightened and refitted; the glass-work of the lantern reset, chimneys repointed and plastered; the tower has received a coat of mortar; a drain for the cellar has been constructed.

Point Reyes.—Instructions have been given to the engineer of the district to institute legal proceedings for the condemnation, according to the laws of California, of sufficient land for a light-house at this point, with a landing at Drake's bay, and a right of way. The exorbitant price for a spot valueless for any other purpose, which has been demanded by the owners of the rancho on which the point is situated, has been for several years the sole obstacle in the way of establishing a light-house there.

Point Arenas.—A reservation has been made of the site for a light-house at this point, and an appropriation by Congress for the purpose is available. The construction of the work will be commenced as soon as practicable.

Cape Mendocino.—The iron light-house and the keeper's dwelling for this station were completed in San Francisco in September, 1867; but the lens and lantern not arriving in time, the shipment of the tower, lantern and lens was delayed until July last, when they were shipped to Eureka, in Humboldt bay, about thirty miles to the northward of the cape, to avoid the difficulty and risk of landing them there. All the materials for the keeper's dwelling were shipped to the cape during August and September of 1867, a portion of them on board of sailing vessels, and some on board of the steam tender Shubrick. The wreck of that vessel and the probable loss of those materials were mentioned in the annual report of last year. The hull of the Shubrick has since been recovered, but the light-house materials were lost.

The nature of the ground at Cape Mendocino makes it difficult to secure a good foundation. The excavation for the foundation of the keeper's dwelling was made during the summer in ground as hard as rock, and apparently of equal consistency and durability. In the rainy season, however, this ground becomes soft, and on many parts of the coast, near the cape, landslides have occurred. With these peculiarities in view, the site for the dwelling was chosen on the outcropping of a ledge of shale rock, a ditch was dug round the house, and the bank of the excavation sloped off. These precautions, it is believed, render the foundations secure; it is, however, proper to state that some inconsiderable cracks have appeared in the walls. Should they increase in size or number, it will become necessary to secure the walls by iron ties. The spot selected for the tower was on a projecting rocky ridge; but as that also becomes softer in winter, an excavation has been made two feet deeper than originally intended, and the space filled in to a depth of two feet,

and a little larger in circumference than the bed-plate of the tower, with concrete.

By the last advices it was expected that the tower would be finished in October of this year.

The dwelling is 29 by 31, with two additions for kitchens, 12 by 14, and is built of the best materials. The walls are of brick, with an air space between; the roof is covered with galvanized iron. In consequence of the great difficulty in landing materials on the open sea-shore, the cost of transportation has exceeded that of the materials.

371. *Humboldt*.—Has been visited and found in good condition.

BUOYS ACTUALLY IN POSITION.

Two conical buoys have been placed to mark the entrance of Petaluma inlet, head of San Francisco bay.

After a careful examination, and a consultation with pilots, the following buoys were placed at Humboldt: One first-class iron outside of the bar at the entrance of the harbor, and one third-class iron inside, and directly opposite the entrance on Howard spit.

The inspector reports that no more buoys are required in the bay, as the bar is constantly changing, and vessels never go in or out without a steam-tug and a pilot.

SPARE BUOYS TO SUPPLY LOSSES—NOT REPORTED.

Tenders steam.—In the last annual report it was stated that the steam tender Shubrick attached to the 12th and 13th districts had been wrecked on the coast, about 30 miles below Cape Mendocino.

Prompt measures were taken to save all movable articles, and the engine and machinery were taken out and brought to San Francisco. The boiler, which had been long in use, was taken out and abandoned, not being worth the expense of repair. When the vessel was hauled on shore for repairs, it was found that she had been driven with such force upon a sunken boulder, as to fix it in her port bow so firmly that recourse was had to blasting to extricate it. The hole left was eight feet long and seven wide. The hull, after being taken up on the beach out of reach of the sea, where the leak was stopped, was successfully launched in May, 1868, and brought to San Francisco, and by the courtesy of the Navy Department placed at the navy yard, Mare island, for repair. Upon a careful survey, repairs amounting almost to an entire renewal of the hull were found necessary, a fact by no means surprising, considering that the vessel had been in constant service for upward of ten years, with comparatively slight repairs, and the extraordinary shock she received when she was wrecked. According to the latest information received at this office the Shubrick is expected to be ready for service early in November of the present year. At the time of sending in the estimates for light-house purposes for the current year, it was supposed that the Shubrick was a total loss, and an appropriation was asked of Congress to build a vessel to supply her place. This appropriation was granted; meanwhile the Shubrick having been recovered, and the estimated cost of her repair nearly reaching that required for building a new vessel, it became a question how the sum granted by Congress ought to be applied. The Secretary of the Treasury, to whom the subject was referred, was of opinion that the appropriation having been made with a view to supply a deficiency caused by the loss of the only tender on the Pacific coast, it would be most properly used in defraying the expenses of her repairs,

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which were too large to be met by the general fund appropriated for the maintenance of the light-house establishment.

THIRTEENTH DISTRICT,

Embracing the Pacific coast belonging to the United States north of the 41st parallel of latitude. There are in this district—

Light-houses and lighted beacons.....	9
Light-vessels	None.
Beacons unlighted.....	None.
Buoys actually in position	21
Spare buoys to supply losses	7
Tenders, steam, (common to 12th and 13th districts).....	1
Tenders, sailing (a sailing schooner has been chartered during the repair of the steam tender Shubrick).....	None.

LIGHT STATIONS.

372. *Crescent City*.—Station found in good condition, excepting that the floor timbers in the south end of the house, where they join the walls, are much decayed; they may still last, however, for a number of years.

Cape Blanco.—A piece of land has been purchased as a site for a light station at this cape. It is hoped that the light-house will be built, and a first-order light exhibited next year. The land purchased by the United States is bounded by a bluff bank, rising abruptly from the sea, and by a meridian line, and is inaccessible except by passing through the adjoining private property. Materials for making and burning brick are found on this property, and not on the land owned by the United States; consequently it has been necessary to purchase a right of way with privilege of taking water, sand, clay, and wood; a contract has also been entered into for making the bricks and for clearing the light-house site on the Cape.

373. *Cape Gregory*.—In good condition, and supplied for the year. No repairs are required to the dwelling. The tower required repointing, which was ordered.

374. *Cape Hancock*.—Was found to require extensive repairs. The building has been repainted, a new wood-shed erected, the foundation of the storehouse and cistern repaired, besides some slight repairs to the inside of the dwelling. Supplied for the year.

375. *Shoalwater bay*.—The engineer of the district reports the following repairs in progress: Reshingling the roof of keeper's dwelling; building a bulkhead around the foundation to keep the sand in place. House, tower, and lantern in good condition, and station supplied for the year.

376. *Cape Flattery*.—The keeper's dwelling, which is of stone, was found, on inspection, to be very damp, and the walls, discolored by moisture, causing illness among the keepers. The walls have been thoroughly oiled and painted, an extra amount of fuel has been furnished the keepers for the purpose of drying the house, and the engineer of the district has been requested to devise a permanent remedy for the defect. Station supplied for the year.

377. *New Dungeness*.—The light-house and tower were found in good condition. Sufficient lumber was furnished to the keeper to make new covers to the cistern. Station supplied for the year.

378. *Smith's island*.—In good condition; no repairs required; supplied for the year.

379. *Admiralty Head*.—Buildings in good condition, generally. Orders have been given to repaint the outside of the keeper's dwelling; also, a stormhouse, for the protection of the kitchen door against wind and rain. As there was no cistern to the house, and the supply of water, obtained from a pool at some distance from it, being small, a cistern has been ordered to be constructed. Station supplied for the year.

380. *Ediz Hook*.—At this station no other repair was found necessary than to repaint the keeper's dwelling. Material has been sent for that purpose.

BUOYS ACTUALLY IN POSITION.

North channel of Columbia river, marked by four iron buoys, has changed so much within the past year that it is no longer safe, except for vessels of very light draught, handled by experienced persons. It is contemplated, whenever a suitable vessel shall have been provided for the district, to take up all these buoys.

South channel of Columbia river is marked by five iron buoys, and two spar buoys.

Woody Island channel of Cathlamet bay is marked by six spar buoys.

Gray's Harbor entrance is marked by four iron buoys. The inspector of the district reports that this channel, though well buoyed, has not been used by any but the supply vessel, since the buoys were placed.

In *Puget sound* there are no buoys, but the inspector recommends that a buoy be placed off New Dungeness spit, which has within two years made out more than a mile.

TENDERS.

There has actually been none, except a chartered schooner. The extent of the thirteenth district, recently increased by the acquisition of Alaska, together with the impossibility of properly performing the light-house and buoy service with a sailing vessel, even if the board had one, makes it absolutely necessary that a steam tender should be provided, and the required estimate therefor is submitted. Without the steam tender it may be considered certain that the service cannot be efficiently attended to.

ALASKA.

After the treaty for the purchase of this territory had been ratified by Congress, the Board ordered that the expenses of the light at Sitka, previously maintained by the Russian government, should be defrayed by the United States light-house establishment.

It was previously known to the Board that an expedition to Alaska had been ordered by the Secretary of the Treasury, which would be accompanied by a coast-survey party for the purpose of making a geographical reconnoissance. The Superintendent of the Coast Survey was therefore requested to instruct the assistant in charge of the party to examine and report upon the aids to navigation required in Sitka sound and the approaches to the harbor of New Archangel or Sitka.

The following memoranda, gleaned from Mr. Davidson's valuable report, will greatly assist the Board in properly marking those approaches. (See Appendix L, p. 307, Ex. Doc. No. 177.)

Heads forming the entrance to Sitka sound.—These are the south point of Kuxczor island, called Cape Edgecumbe, and the northwest point of Biorka (Beech) island. Biorka bears E. by S. $\frac{1}{4}$ S. by compass, and is distant 11 miles from Cape Edgecumbe. The cape is the rocky bluff.

shore of the flooded plateau making out from the base of the extinct volcano, Mount Edgecumbe, which is situated about four and a half miles north-northeast from the cape. It has an extended horizontal summit, the rim of the crater 2,800 feet above the ocean, with regular sloping sides, and forms a most characteristic landfall for the port. The navigators of the Russian American Company regard it as the most recognizable headland along the coast, being readily known 50 miles at sea. Mr. Davidson remarks that "if a complete system of lights were warranted by the commercial importance of the sound, a light should be put upon Cape Edgecumbe and one on Biorka island; but under present circumstances thinks the inner lights and aids to navigation he recommends are sufficient and first needed. These are as follows:

On Vitskari Rock, (Sitka sound,) a light of the second order, to be about 100 feet above the sea, and thus be visible from a ship's deck about 16 miles in clear weather. It would command an arc of the horizon of 70° from southwest by west to south-southeast, of which a few degrees would be intercepted by the island of St. Lazanef. A vessel from the southward would thus open it by Biorka island, when well in with the coast. The tower should be painted black, that it may be more readily made out in thick weather, especially when the water breaks around it. According to the present arrangement, vessels approaching in thick weather, or at night, fire a gun, and are answered by a gun and light from the governor's house. If found practicable it may be well to provide a gun at Vitskari to answer the signal from vessels. Mr. Davidson found it impossible to land upon Vitskari during his stay at Archangel, on account of bad weather, and could not, therefore, measure the extent or ascertain the nature of the rocks, and the difficulties of working them; but from examination of the rocks on the adjacent islands he thinks there is no doubt that an ample and secure foundation may be had. Vitskari is preferred as a light-house site to the Kulichoff Rock, (which rises 20 feet from the water, with adjacent reefs,) Vitskari being the more dangerous locality, and on that side of the sound navigators would prefer, as the southern and eastern shores are broken up by innumerable islets and rocks.

On the island of Mochnati it is recommended to establish a light of the fifth order about 80 feet above the water. In approaching the islets which lie outside of the anchorage of New Archangel in thick weather, the navigators of the Russian American Company endeavor to make Mochnati. It is five miles distant from Vitskari rock, from which it bears NW. by N. $\frac{1}{4}$ N., is from 20 to 30 feet high, rocky and covered with a thick growth of spruce, whose dark foliage, with the black rocks beneath, brought out in sharper relief by the surf breaking round it, makes it discernible through the fog when the other islands cannot be recognized. To increase this relief, the buildings of Mochnati should be white, except that part of the tower which is higher than the tops of the trees, which should be painted black. It is obvious that the background of trees should be carefully preserved. In addition to lights Mr. Davidson thinks it may be necessary to place buoys on the Vitskari and Kulichoff reefs; but a more detailed examination is required to determine the necessity and practicability of that measure. He recommends a buoy or the building of a stone beacon at the edge of the reef forming the west side of the entrance to the western channel on the outer extremity of that part which is bare at low water. The whole extent of this ledge is about one quarter of a mile northwest and southeast, and one-eighth of a mile wide. Upon the rock in mid-channel north-northwest

of the west end of Japonski island and NE. $\frac{1}{2}$ E. from the west end of Battery island, bare at half tides, he proposes a beacon to be built of dark stone with a base of about 20 feet diameter and an elevation of 20 feet, in the form of a frustum of a cone. This would save the expense of repairing buoys and keeping them in place, and be a much more distinguishable mark in thick weather.

Other rocks are mentioned which it may be necessary to mark; among these is the Zenobia rock, described by a captain of the Russian American Company as a bayonet rock, the position of which is not accurately known and can only be determined in good smooth weather. It will be necessary to make a detailed examination for the position of a buoy.

Aids to navigation necessary for the approaches to the harbor of St. Paul, Kodiak island.—This station, formerly the chief depot of the Russian American Company, now ranks next in importance to that of Sitka. The two entrances to St. Paul's harbor generally adopted are round the north and south end of Wooded island and designated respectively the northern and southern channels. To the eastward of Wooded island and separated by a channel one mile wide lies Long or Barren island, which is nearly four miles long, north-northeast and south-southwest, averaging a mile in width. It has extensive reefs off its north and south points. The north point of the island is about 200 or 250 feet high, with bold rocky shore. Mr. Davidson passed close to it when entering St. Paul by the south channel, and had a fair opportunity to judge of its availability and importance as a site for a light-house. In leaving by the north channels his first impressions were confirmed. A light there would be seen by vessels coming out of Narrow strait to the west-northwest, and from Rabbit bay, when clear of Spruce island. A reef with a small islet makes off three-quarters of a mile from the point, while a reef and islet lie half a mile southeast of the south end.

Both channels have dangers in their approaches; the northern channel has a sunken ledge called "William's bank" lying three miles north of the north end of Long island. It has deep water round it. Upon it were formerly two buoys, red and blue. Mr. Davidson recommends as a second light-house site, Near island, from which station he obtained bearings of the breakers on William's bank which placed it half a mile nearer the northwest point of Long island than it is laid down in the charts. It bears from Near island north $44^{\circ} 12'$ east, (by compass.) Between William's bank and the reef off the northwest point lies a sunken, sharp, isolated rock, having but 10 feet of water over it at low water, with very deep water around it, and no breaker seen upon it. The Russian American Company's vessel the Kodiak struck upon it, had her bottom pierced and was lost. Its position has since been determined to be two miles north-northwest from the northwest point of Long island, and, with William's bank and the reef off the point, lies on the prolongation of the shore of the west side of Long island. One mile north-northeast from White Fir cape is a rock and reef.

In the southern approaches to the harbor, there are the Humpback, 18 feet above water, and other dangers near the entrance of the harbor. To avoid these dangers and to give a vessel's position by cross-bearings upon two objects, to avoid William's bank and the Humpback, a harbor light is recommended to be established upon the high ridge at the northern end of Rocky island abreast of the town. This light would be seen up to the anchorage off the ice company's wharf by both channels, and also for the whole bay of Chinyak and the channel to the south and east.

A buoy is needed on the north end of the reef which makes nearly

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half a mile northward from the extremity of Topaskoff inlet, with seven fathoms water close to its extremity.

A buoy should also mark the extremity of the reef making north from the north point of Near island, and forming one side of the entrance to the narrow harbor of St. Paul.

All the approaches and entrances to this harbor need extensive and detailed examination.

The two lights recommended are considered amply sufficient to mark the approaches and entrances to St. Paul's, however important it may become. The light on Long island is the most important of the two. The materials for this light can be safely landed in the land-locked bay on the west side of the island and thence transported to the island about a mile distant. Upon Near island a roadway would have to be made along the steep sides of the island, for carrying up stone and other materials. The stone of which the island is composed, and which crops out at the summit of the island, may be found fit for building purposes.

In some places in the harbor of St. Paul a highly metamorphic sandstone may be found available for building. No limestone was known to exist there.

Aids to navigation for Unalaska bay.—Unalaska bay lies on the north side of the island of the same name, one of the group of Fox islands.

The general direction of the bay is about south-southwest for 11 miles, contracting to a small harbor called Captain's harbor, and about half-way inside the entrance is divided by a bold, high island called Ahmaknock, rising precipitously to an elevation of 1,800 feet and sloping southward to Captain's harbor so as to form Illoolook harbor on its eastern side eight miles inside Kaleochla cape.

Illoolook harbor is a mile wide, with a depth of water from 20 to 7 fathoms over irregular bottom.

A point on the outer face of the precipitous head of Ahmaknock. On the outer face of this head the light would have an arc of visibility extending from north 70° west (compass) tangent to Cape Cheerful round by the north to north 24° east tangent to Cape Kaleochla. In this situation it would have the advantage of guiding vessels into Captain's harbor, on the west side of Ahmaknock island, and would be seen after passing seven or eight miles westward through Akatan strait.

A position should be selected about 100 or 150 feet above the water, where the wall-like cliff begins to slope inward. The tower should be painted white so as to contrast with the dark rocky mass behind it. To reach the position that would open Cape Cheerful a roadway would have to be made for about half a mile from the lowland at the head of Polucha bay, where a vessel can anchor in 10 fathoms water, rocky bottom close to the shore. The dwelling could be built here, where some of the Aleutians have small patches of garden for raising turnips and potatoes.

This bay may become an important point for the curing of codfish caught in this vicinity. It is sometimes visited by whalers, but at present is deficient in the kind of supplies which would induce them to touch there. The Coast Survey party passing eastward through the narrow Strait of Unalga counted 10 sperm whales within an hour. Upon entering it a week before, they saw nearly as many to the east-southeast of the straits.

All of which is respectfully submitted.

W. B. SHUBRICK,
Chairman.

ANDREW A. HARWOOD, *Naval Secretary.*
O. M. POE, *Engineer Secretary.*

REPORT OF THE LIGHT-HOUSE BOARD.

REPORT

OF

THE UNITED STATES LIGHT-HOUSE BOARD.

[Light-house Board of the United States, organized in conformity to the act of Congress approved August 31, 1852.]

LIST OF MEMBERS.

HON. GEORGE S. BOUTWELL, Secretary of the Treasury, *Ex-officio* President.

REAR-ADMIRAL W. B. SHUBRICK, U. S. Navy, Chairman. PROF. JOSEPH HENRY, LL. D., Secretary Smithsonian Institution. BREVET BRIG. GEN. HARTMAN BACHE, Colonel of Engineers. BREVET MAJ. GEN. RICHARD DELAFIELD, Brigadier General of Engineers.	REAR-ADMIRAL C. K. STRIBLING, U. S. Navy. PROF. BENJ. PEIRCE, LL. D., Superintendent Coast Survey. COMMODORE THORNTON A. JENKINS, U. S. Navy, Naval Secretary. BREVET BRIG. GEN. O. M. POE, Major of Engineers, Engineer Secretary.
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CHAIRMEN OF COMMITTEES.

<i>Finance</i> .—GENERAL RICHARD DELAFIELD. <i>Engineering</i> .—GENERAL HARTMAN BACHE.	<i>Lighting</i> .—PROF. BENJ. PEIRCE. <i>Floating Aids</i> .—ADMIRAL C. K. STRIBLING. <i>Experiments</i> .—PROF. JOSEPH HENRY.
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The Chairmen and Secretaries are *ex-officio* members of all committees.

TREASURY DEPARTMENT,
Office Light-house Board, October 15, 1869.

SIR: I have the honor respectfully to submit for your consideration, and for the information of Congress, a report of the operations of the light-house establishment during the past year.

It has been the endeavor of the board to conduct the administration of the establishment at all times with the most rigid regard to true economy and efficiency, holding its agents to the strictest personal responsibility in the performance of duty; making frequent supervisory visits to, and examination of, works of construction and repair, and requiring inspections and reports, at short intervals, of all existing lights, fog-signals, beacons, and buoys in position.

The detailed statements under the heads of the respective districts, based upon the reports of the engineers and inspectors, show the actual condition of all the aids to navigation, and it will be seen that while the lights and other aids are in a condition of efficiency, so far as they are required to meet the wants of the mariner, there are many stations at which renovations and improvements are greatly needed, and a few at

which reconstructions are indispensable. The necessity for these rebuildings, renovations, and improvements arises from the natural decay of buildings and sites so greatly exposed to the action of the storm winds and heavy seas, as are most of the light and beacon stations during the equinoctial winter seasons of storms.

The estimates submitted with this report for the fiscal year ending June 30, 1871, show a small aggregate increase in the amount over the appropriations for the current fiscal year. This small increase is caused by the necessity to provide the necessary means for the support of additional aids authorized by Congress. Some of the items, under the different heads of estimates, differ in amount from those of last year. The small increase of amount for supplies is caused by the increased number of fog-signals, requiring a larger quantity of coal than those heretofore in use at several important points, and for supplies for new stations. Where the amounts under particular heads, as in the light-vessel service, are diminished, they are caused by the substitution of permanent light-houses (costing annually much less for their maintenance) for light-vessels. Many additional aids to navigation have been authorized, and will be in use during the present and next fiscal year, on the southern coast and on the interior navigable waters, which were destroyed during the rebellion, but have again become necessary. At several important points on the Pacific coast light-houses are being built; and the greatly increased and daily increasing commerce of the upper lakes of the Northwest renders it necessary to establish all the fixed and floating aids authorized and required there without delay.

The estimates for special objects and localities embrace only such as it is believed are required to subserve the best interests of the country. No new aid to navigation has been estimated for, which has not been examined into and favorably reported upon, while many applications for lights at different points have not been included for want of satisfactory information in regard to their necessity or importance at this time.

The board feels bound to invite the attention of Congress in a special manner to the great necessity which has long existed for lighting the dangerous coast between Capes Henry and Hatteras, a distance of nearly one hundred and twenty miles, upon which there is nothing to aid the mariner. Prior to 1861 there was a small light at Body's Island, which was destroyed during the war. To complete the illumination of this part of the coast, one light at the central position of the present unlighted coast is of pressing necessity, with two smaller lights, one on either side of it, at the same time or subsequent to the erection of the principal one. Of like importance is a first-class light on Alligator Reef, (Florida Pass,) the only remaining dark space of sixty-one nautical miles on those dangerous reefs. This station was embraced in the original programme of sea-coast lights, and its erection would doubtless have been authorized long ago, but for the pressure of other works on those reefs before the war, and the impossibility of doing anything there from 1861 to 1866. Special estimates have been submitted for these lights.

FIRST DISTRICT.

In the first district, extending from the northeastern boundary, Maine, to include Hampton Harbor, New Hampshire, there are:

Light-houses and lighted beacons	46
Beacons, (unlighted)	44
Buoys actually in position	316
Spare buoys, to supply losses	153
Tenders, (screw steamer Iris)	1

The following is a statement of the operations in the district during the past year, together with the present condition and requirements:

1. *West Quoddy Head*.—A steam fog-signal has been established; a good road one hundred and twenty-six rods in length has been made from the station to the western boundary of the government land; the cellar drain has been relaid deeper so as to thoroughly drain the cellar, and the station generally repaired and put in good order.

2. *Little River*.—The station has been put in good repair, and supplied with a new cook-stove and other small supplies.

3. *Libby Island*.—Small repairs have been made to the winch in the boat-house, and to the lamps, &c. The station is now in good order.

4. *Moose Peak*.—The keeper's dwelling requires repairs; these have been authorized, and when made, and a new woodshed built, the station will be in good condition.

5. *Nash's Island*.—A new set of Franklin lamps has been supplied, and the station furnished with a new cook-stove and pipe. It is proposed to build a boat-house and provide it with a crane.

6. *Narraguagas*.—The lamps have been overhauled and put in good order. It is proposed to paint the dwelling white, to serve as a day-mark.

7. *Petit Menan*.—Eighteen cast-iron steps of the tower, which were broken by the accidental fall of the weights of the revolving machinery, have been replaced. A new leading wheel and shaft have been put into the revolving machinery, and the broken windows of the dwelling repaired. The boat slip requires repairs, and an addition of twenty feet at the lower end.

8. *Winter Harbor*.—A lantern stove has been supplied, the pump repaired, and burners fitted with new tubes. The station is in good condition.

9. *Mount Desert Rock*.—A cook-stove and pipe have been supplied, burners repaired, and glass replaced; forty-nine pounds Manila rope have also been supplied. The station is in good condition.

10. *Baker's Island*.—Burners have been refitted with new tubes, oil butts repaired, glass supplied, and a cast-iron smoke-pipe provided for the lantern.

11. *Bear Island*.—New tubes supplied to the burners; nothing more required.

12. *Bass Harbor Head*.—In good condition.

13. *Edgemoggin*.—The pump has been fitted with new valves, the time-piece cleaned, and seventeen pounds funnel, one fire-back, and front guard for cook-stove, and five pounds paint have been supplied.

14. *Saddleback Ledge*.—The cellar of tower is to be relined with brick, the plastering repaired, and the interior wood-work repainted, after which the station will be in good order.

15. *Heron Neck*.—Funnel, wash boiler, lantern stove, and other small supplies have been furnished, and new burner tubes provided. After some slight repairs have been made, and the exterior of the dwelling painted white to serve as a day-mark, the station will require nothing further.

16. *Deer Island Thoroughfare*.—A boat-house is required at this station.

17. *Eagle Island*.—Burners fitted with new tubes. Station in good order.

18. *Pumpkin Island*.—Burners fitted with new tubes. Trifling supplies furnished. Station in good condition.

19. *Matinicus Rock*.—After an efficient fog-signal is established at this station, it will require nothing further.

20. *White Head*.—A steam fog-signal is being constructed for this station, to contain which, temporary buildings have been erected. A well to supply water to the fog-signal apparatus has been dug, fifteen feet in depth and twelve feet in diameter.

21. *Owl's Head*.—A small bell has been attached to the porch of the tower, to be sounded as a fog-signal; new burners have been put in, leaks in lamps stopped, and lantern stove, with pipe, supplied. In good condition.

22. *Brown's Head*.—Two burners have been put in, and a cook-stove supplied. In good condition.

23. *Negro Island*.—In good condition.

24. *Grindel's Point*.—In good condition. It is proposed to paint the dwelling white, to serve as a day-mark.

25. *Dice's Head*.—In good condition.

26. *Fort Point*.—In good condition.

27. *Tenant's Harbor*.—Revolving machinery has been cleaned, new tubes supplied to burners, and a house pump provided.

28. *Marshall's Point*.—In good condition.

29. *Manheigin*.—The revolving machinery has been cleaned, glass set in the lantern, a new lantern ventilator put on, and a lantern stove supplied. In good condition.

30. *Franklin Island*.—Revolving machinery cleaned, new tubes fitted to burners, and cook-stove and fixtures supplied. In good condition.

31. *Pemaquid Point*.—In good condition.

32. *Burnt Island*.—After the boat belonging to this station had been repaired, it was destroyed in the gale of the 8th September. When a new one is supplied the station will be in good condition.

33. *Hendrick's Head*.—A pump, with a small quantity of lead pipe, has been provided. It is proposed to paint the exterior of the tower.

34. *Pond Island*.—A new boat, with outfit, has been supplied. The frame tower of fog-signal was blown down in a late gale, and, together with the machinery, was broken up. The bell was not injured. It is proposed to restore the fog-signal, after which the station will be in good condition.

35. *Sequin*.—The burners and oil butts have been repaired, the roof re-shingled, and the walls of tower and dwelling re-pointed with cement mortar. The chimneys blown down in the recent gale must be rebuilt, when the station will be in good condition.

Half Way Rock.—A light-house on this rock has been authorized, plans approved, and the work is now in progress. The surface of the rock at the site of the light-house has been cut to the proper level, and the stones are being quarried and cut. The station is to consist of a granite tower, provided with an illuminating apparatus of the second order.

36. *Cape Elizabeth*.—A steam fog-signal has been established, lamps and burners repaired, curtains furnished, revolving machinery cleaned, six windows supplied, and lantern stoves provided. The western tower is an old rubble-stone structure, lined with wood, and having a wooden stairway. This tower should be rebuilt, and a permanent building erected for the fog-signal, but it is not probable that any detriment to the service will arise from a little delay, and therefore no estimate is now submitted for an appropriation to make these improvements.

37. *Portland Head*.—The gale of the 8th September destroyed the fog-bell tower, but it was immediately rebuilt, and an eighteen-hundred-pound bell and Stevens's striking machinery provided. This station is now in good condition.

38. *Portland Breakwater*.—The tower requires clapboarding to put it in good condition.

39. *Wood Island*.—The revolving machinery has been cleaned, and burners re-tubed. The station is now in good condition.

40. *Goat Island*.—In good condition.

41. *Boon Island*.—A new boat-house has been erected, boat-slip repaired, and woodshed shingled and clapboarded. The exterior of boat-house, woodshed, and storm-house, and trimmings of dwelling, have been painted two coats brown. The lamps and other illuminating apparatus have been overhauled, and the station is now in good condition.

42. *Whalesback*.—This station is much exposed, and has for some time been in bad condition. It suffered severely from the gales of last winter and spring—particularly in those of March last, which caused cracks in the tower and its foundations. The iron clamps which were intended to secure the stones of the foundation pier are all broken, and the stones on the upper side are cracked and started out. By putting an iron band of six inches by two around the upper course of stone of the pier an attempt has been made to put the station in a condition to last through the coming winter, but there can be no reliance upon this expedient for any length of time, and there is no doubt but the station should be rebuilt as soon as possible, for which purpose the sum of seventy-five thousand dollars is included in the estimates accompanying this report.

43. *Portsmouth Harbor*.—Has received slight repairs and small supplies, and is now in good condition.

44. *Isle of Shoals*.—The revolving machinery has been cleaned, lamps repaired, six panes red glass set in the revolving apparatus. Is now in good condition.

UNLIGHTED BEACONS.

The following are the unlighted beacons in the district, and are all in good condition unless otherwise stated:

1. *Jerry's Point, Portsmouth Harbor*.—Iron beacon.
2. *South Beacon, Portsmouth Harbor*.—Stone beacon.
3. *North Beacon, Portsmouth Harbor*.—Wood beacon.
4. *Willey's Ledge, Portsmouth Harbor*.—Iron spindle.
5. *York Ledge, off York River*.—Iron spindle.
6. *Fishing Rocks*.—Iron.
7. *Stage Island Monument, Saco River*.—Stone.
8. *Sharp's Rock, entrance to Saco River*.—Iron spindle. This spindle has been broken off, and is to be replaced.
9. *Back Cove, Portland Harbor*.—Wooden piles.
10. *White Head Ledge, entrance to Portland Harbor*.—Iron spindle.
11. *Trott's Rock, entrance to Portland Harbor*.—Iron spindle. Shaft bent, and day-mark gone. Is to be straightened, and have a new day-mark supplied.
12. *Mark Island Monument, Casco Bay*.—Stone tower.
13. *Black Jack Rock, entrance to Kennebec River*.—Iron socket, wooden shaft, with cage on top.
14. *Seal Rock, Kennebec River*.—Iron spindle.
15. *Lee's Rock, Kennebec River*.—The iron and wood spindle formerly marking this was carried away by the ice in the spring of 1858. A new iron spindle has been prepared, the rock drilled to receive it, but the

stage of water has been such, whenever the rock was visited for the purpose of placing the spindle, that the work could not be done.

16. *Ram Island Ledge, Kennebec River.*—In place of the beacon of iron and wood, which was carried away by ice in the spring of 1868, an iron spindle has been set to mark the danger.

17. *Winslow's Rocks, Kennebec River.*—Iron and wood spindle, with red cask on top.

18. *Ames's Ledge, Kennebec River.*—Iron socket and wooden shaft, with red cask.

19. *Beef Rock, Kennebec River.*—Same as No. 18.

Lime Rock, Back River.—Iron and wood. Built this season.

Carlton's Ledge, Back River.—Iron and wood. Built this season.

Clough's Rock, Sheepscot River.—Iron and wood. Established this season.

Merrill's Ledge, Sheepscot River.—Iron and wood. Established this season.

20. *Yellow Ledges, Penobscot Bay.*—Iron spindle.

21. *Garden Island Ledge, Penobscot Bay.*—Iron spindle.

22. *Otter Island Ledge, Penobscot Bay.*—Iron spindle.

Ash Island Point, Mussel Ridge Channel.—Iron socket, wooden shaft. Established this season.

23. *Dodge's Point Ledge, Penobscot Bay.*—Wooden mast.

24. *Porterfield's Ledge, Penobscot Bay.*—A stone beacon.

25. *Lowell's Rocks, Penobscot Bay.*—Iron spindle.

26. *Seal Ledge, Penobscot Bay.*—Iron spindle.

27. *Harbor Ledge, Penobscot Bay.*—Stone beacon.

28. *Ship Yard Ledge, Penobscot Bay.*—Iron spindle; top is broken off.

29. *Fiddler's Ledge, Fox Island Thoroughfare.*—Stone beacon.

30. *North Point of Northeast Ledge, Camden Harbor.*—Iron spindle.

31. *Morse's Point Ledge, Camden Harbor.*—Iron spindle.

— *Otter Rock Shoal.*—This stone beacon was carried away by ice. It is not proposed to rebuild it at present, its place being supplied by a spar buoy.

32. *Hosmer's Ledge, entrance to Castine Harbor.*—Stone monument.

— *Middle Ground, entrance to Castine Harbor.*—Was a stone monument. It was carried away by ice in the spring of 1868. It is not proposed to rebuild it at present, its place being supplied by a spar buoy.

33. *Steele's Ledge, Belfast Harbor.*—Stone beacon.

34. *Fort Point Ledge, Penobscot River.*—Stone beacon.

35. *Odom's Ledge, Penobscot River.*—Stone beacon.

36. *Buck's Ledge, Penobscot River.*—Iron spindle.

Ship and barges, Blue Hill Bay.—An iron and wood beacon, now under construction. It is intended to mark a point in the course between Edgemoggin Light and Bass Harbor.

37. *Bunker's Ledge.*—A stone beacon, marking the approach from the eastward into southwest and northeast harbors, Mount Desert.

Half Tide Ledge.—A beacon, to consist of a wooden socket and bearing a red cask, is now in course of construction. It is intended to mark a point on the course between Millbridge and Jonesport.

Southwest Reef, Norton's Island.—A beacon, to consist of an iron tripod with iron shaft bearing an iron cage painted red, is now under construction, intended to mark a point between Millbridge and Jonesport.

Snow's Rock, east entrance of Moose-à-bee Reach.—This beacon, now under construction, is to consist of an iron socket supporting a wooden shaft bearing a red cage.

Gilchrist's Rock, eastern entrance to Moose-à-bee Reach.—A beacon, to

consist of an iron shaft with red cage, is now under construction to mark the danger.

Moose Rock, Sequin Passage, eastern entrance to Moose-à-bee Reach.—An iron tripod, bearing a shaft and red cage, is now under construction at this point.

38. *Western Bar, Lubec Narrows.*—A wooden crib, filled with stone, supports a shaft, (wooden,) with cask at its top.

39. *The Ledge, St. Croix River.*—This beacon is built of hemlock timber.

BUOYS.

The following buoys have been placed to supply losses during the year, viz: Broad Cove Rock, entrance to Portland, 1st class iron can, twice replaced; Eastern Hue and Cry, 1st class iron can; Bulwark Ledge, 1st class iron nun; Southeast Ledge, 2d class iron can; Petit Menan Reef, 2d class iron can; Witch Rock and Corwin Rock, each 2d class iron nun.

A spar buoy on each of the following, viz: Long Ledge, Moulter's Ledge, Petit Menan Bar, Pond Island Ledge, Lower Middle Ground, Dyer's Island Ledge, Powder Ledge, Bald Ledge, Foster's Island Ledge, Burnt Island Ledge, Mark Island Ledge, Stave Island Ledge, Tony's Rock, Pond Island Reef, White's Ledge, Monk's Ledge, Leslie's Ledge, southern end St. Croix Island, northern end St. Croix Island, Middle Ground, Elliott's Flats, Knight's Point, Husey's Ledge, Hardy's Ledge, Bridge's Ledge, Small Point, Hardy's Upper Point Ledge, Stoddard's Ledge, Nova's Rock, Bay Ledge, Sister's Ledge, Simms's Rock, Jordan's Delight Ledge, Sawyer's Ledge, Drisco's Ledge, Prospect Ledge, Prospect Harbor Ledge, New Harbor Ledges, Heron Island Ledge, Baker's Ledge, Snow's Rock, Gangway Rock, New Island Bar, Hussey's Rock, Wharf Rock, Half Tide Ledge, Southeast Rock, Buck's Harbor Ledge, Frost's Point, Oliver's Island, Ram Island Ledge, Moose Peak Bar, Stover's Ledge, Freeport Ledge, Whale Boat Ledge, Hypocrite Ledge.

New spar buoys have been set to mark the following dangers, not heretofore indicated, viz: Heron Island Ledge, Tony's Ledge, Franklin Island Ledge, and Pumpkin Island Ledge, at entrance to Edgemoggin Reach; Tibbett's Narrows Ledge, East Point, Sheep Island, and Round Island, to mark Moose-à-bee Reach, Shore Ledge, and Beech Point Flats, in the channel of Machias River; Cranberry Island Ledge and Flynn's Ledge, entrance to Southwest Harbor; Pond Island Point, Blue Hill Bay; Mark Island Ledge, Penobscot Bay; and Wharf Ledge, Portsmouth Harbor.

STEAM TENDER IRIS.

In November last a new boiler was put into this tender. In doing this it was found that the deck and all the beams over and forward of the boiler were so rotten that new ones, with additional knees, had to be substituted. Much of the ceiling under the bottom of the boiler had also to be repaired. The pilot-house was very shaky, and a new one of less size was built, with a gain of considerable room, which made it possible to carry on deck two first-class buoys, instead of one, as formerly, as well as giving room for the storage of an additional amount of coal. The deck has been replaced with three-inch hard pine, and without any sheathing, since experience has shown that this has a tendency to cause

rot in the deck it covers. The old deck was two and a half inches thick.

So valuable have been the services of this steamer in replacing important buoys that instances have occurred in which buoys, driven from their moorings by stress of weather, have been replaced by others within twenty-four hours afterward. It would certainly require two, and perhaps three, sailing vessels to perform the same efficient service. Previously to the employment of a steamer in this district it was not unusual to be compelled to wait days, and even weeks, for fair weather to replace buoys adrift from their positions off the harbor of Portland, although they were, of all in the district, the most conveniently reached.

In addition to the repairs already mentioned it was found necessary to give the *Iris* a new propeller, a thorough calking throughout, and coppering. She is now in a condition to run for several years before requiring any extraordinary expenditure for repairs of fittings.

Whenever assistance could be rendered to vessels in distress the *Iris* has not failed to do all that she could, and has saved from wreck the steamer *Wm. Tibbetts*, and the ship *Fannie Fish*.

DEPOTS.

It is important that a coal and buoy depot, of sufficient capacity for the storage of spare buoys, coal, and other supplies, should be established at some point near Portland, so that defective buoys may be overhauled, repaired, repainted, and prepared for service; and that instead of purchasing coal in small quantities at market rates, it may be bought by the cargo at that season of the year when it is cheapest.

A plan for the requisite structure is now under consideration, and application has been made to the proper authorities for permission to use, for the purpose indicated, a portion of House Island, the whole of which belongs to the government.

SECOND DISTRICT.

The second light-house district extends from Hampton Harbor, New Hampshire, to include Gooseberry Point, Massachusetts.

In this district there are:

Light-houses and lighted beacons.....	53
Light-vessels, (including one relief).....	9
Beacons unlighted	47
Buoys actually in position	580
Buoys, spare, (to supply losses).....	698
Tenders, (steam)	1
Tenders, (sailing)	1

NOTE.—The lighted beacons at Brant Point and Newburyport have been discontinued since the date of the last report. The Newburyport beacon will, however, soon be re-established upon a new range.

The operations in the district as reported for the present year, and as proposed for the next, are as follows:

45. *Newburyport Harbor*.—In its late position this light did not subserve its purpose, and has therefore been moved in a northeasterly direction a distance of about one-third of a mile, and re-established at a point near the shore of the channel through which it guides. A new cast-iron globe ventilator has been set on the lantern dome, in place of the old straight one, which was worn out. Eight panes of glass on the seaward side of the lantern have been removed and two spare panes supplied. The lantern was badly rusted in the joints and glass seats,

and eight of the sixteen panes were unavoidably broken in taking it apart. However, most of these had been so badly scratched by drifting sand that they were of little value. The removal of the beacon, and its re-establishment to form with the main light an effectual range with the channel across the bar, has been ordered, and when completed will form as good a guide for the entrance of the harbor as is possible, considering the changeable nature of the bar at this point. The completion of the tower in its new site, [involving embankment of the foundation, the proper finish to the boarding and shingling of the wooden frame, and the preparation of a room for the keeper when detained at the tower by stress of weather,] is in progress. The question has arisen whether or not it will be necessary to remove the keeper's dwelling to the vicinity of the light-house. Removing involves either tearing down and rebuilding, or inordinate expense. The dwelling has an excellent underground cellar and a good well of water, neither of which can be had at the new site, and the keeper prefers to incur the labor getting to and from the tower, rather than forego these advantages, and therefore, though the removal of the dwelling may prove to be indispensable, it is not at present recommended.

46. *Ipswich and beacon.*—The kitchen chimney has been topped out and arched with brick laid in cement mortar, in place of the iron ventilator which was blown off. Four door latches, two cupboard catches, and six panes 8" $\times$ 10" glass have been supplied. Early in the year slight repairs of the plank walk from dwelling to tower were made, and new posts and sills for beacon supplied. Recently the entire walk, 989 feet in length, has been renewed. The beacon has been remodeled and moved 130 feet to the range of the main light with the buoys, in the channel across the bar. The illuminating apparatus has been overhauled, and the revolving machinery cleaned and oiled. At present the station is in good repair and order; but the dwelling is damp, being of brick, and standing upon low land, at the edge of a marsh. The difficulty seems to be due to the location of the station, and unavoidable

47. *Annisquam Harbor.*—The dwelling, floors, and finish of one room have been repainted, burners repaired, timepiece cleaned, damaged pane of lantern glass removed, and cooking-stove supplied.

48. *Straitsmouth.*—The roof gutters of the dwelling have been renewed, and water-conductors and weather-boards partially so; the latter being packed with paint cement, and all repainted two coats. One pane 8" $\times$ 18" window glass has been renewed, cistern re-cemented, and two filtering boxes supplied. The privy and inclosure gates have been renewed.

49. *Cape Ann.*—A lathed and plastered partition has been set between the kitchens of the northerly dwelling, in place of the former wooden one. An iron sink has been set in each kitchen, woodwork repainted, and wall paper supplied, as well as new boat, new oil-carrier, and new ensign. The illuminating apparatus has been examined, tin-ware and carillon repaired, lens smoke-stack made and wick-rings supplied. Early in the season slight repairs of the lower end of the boat slip were made, and recently a section of the same, 56 feet in length, has been renewed. An engine-house, 12' $\times$ 24', with 12' posts, has been built for the hot-air engine fog signal, and a 32-inch Ericsson engine and 15 feet trumpet have been set up and adopted as the fog signal of the station, the former signal being discontinued.

50. *Eastern Point.*—The floors and finish of two rooms and hall of dwelling have been repainted two coats. One room has been repapered. The roof of covered way has been reshingled and a post and board

fence 403 feet long built on the landward lines of the light-house property. The illuminating apparatus and fixtures have been overhauled, burners repaired, timepiece and fog-bell apparatus cleaned and oiled, and the latter regulated to eight seconds instead of fifteen, by inserting intermediate pins in the movement wheel. The hammer shaft has been secured by a steel pin. A new boat and a new stove and fixtures have been supplied. During the storm of the 8th September, the fog-bell tower was blown down and destroyed, and the striking apparatus much damaged. The bell was not injured, and has been hung on a temporary frame so as to be struck by hand. The striking apparatus is under repair, and as soon as the bell-tower can be rebuilt it is proposed to re-establish the signal.

51. *Ten pound Island*.—The ceiling of one room has been relathed and plastered, and wall-paper for three rooms supplied. The illuminating apparatus and fixtures have been overhauled. The cistern has been filled by a water boat, the supply of water having failed during the recent dry weather. During the storm of September 8 a chimney was blown down; it was at once rebuilt. A new boat, and stove and fixtures, have been supplied. It is proposed to build a covered way twelve feet long from dwelling to tower, and to provide a single-gearred winch for the boat-house.

52. *Baker's Island*.—The exterior of dwelling, covered walk, and boat-house, and the interior finish of three rooms, have been repainted two coats; three doors and latches, all defective window-glass, and roofs of dwelling, covered way, barn, and privy repaired. Five storm windows for dwelling have been provided. A boat-house, 12 x 24 feet, and a boat-slip thirty feet long, have been built. The illuminating apparatus and fixtures have been overhauled, cistern pump and pipe renewed, handle and latch of lantern door refitted, and the fog-bell machinery regulated to the prescribed interval of twelve seconds. Some damage was done by the storm of September 8, which will be at once repaired. A boat is to be supplied. The two lights at this station are intended to enable vessels to avoid the outer breakers; but being only forty feet apart, and the danger being nearly two miles distant, it is easily seen that they cannot effect any such object; moreover, other and serious dangers are situated upon a range which lies clear of and to the northward of outer breakers. It is proposed to increase the distance between the lights, by moving the seaward tower out as far as the public grounds will permit, and to establish it so that vessels on the new range will be entirely clear of danger.

Salem Harbor.—To complete the lighting of this harbor, and enable vessels to enter it at all times, three small lights are required, and it is recommended that they be built; an estimate of the cost is herewith submitted.

53. *Marblehead*.—The brick oven in the kitchen has been taken away and a closet built in its place; an iron sink set, two chimneys retopped, addition roof reshingled, and wall-paper for two rooms supplied. The walls of covered way have been clapboarded and roof repaired; two window frames of tower have been taken out and reset, packed with paint cement; the privy has been rebuilt, and that and covered way whitewashed; a new ensign, and pipes and linings for stove, supplied.

54. *Egg Rock*.—During the storm of September 8, some slight damages were done to boat-slip steps and porch of dwelling. These are in course of repair. It is reported that in one direction the light is obscured by a chimney, but the inconvenience arising from this is so slight as not to

warrant, at present, the expense of raising the lantern. A new cook-stove has been supplied, and burners of lamp repaired.

55. *Minot's Ledge*.—For the tower, two three-foot joints of six and a half-inch copper smoke-pipe and fixtures; twelve feet rubber tubing for springs of fog-bell apparatus; rubber for packing lantern glass have been supplied, and a pane of glass in the lantern, broke by sea fowl, renewed. At the inshore station the roof of office building has been repaired, buoy shed repaired; chair cushions, medicine-chest, tools, oars, and boat-sails have been supplied and boat repaired. The cellar case is to be renewed, as well as the steps leading to the observatory, and a new boat is to be supplied.

56. *Boston*.—The interior woodwork of dwelling, the tower stairs, and clock-room of bell-tower have been repaired; walls of rooms and halls papered; eight panes 7×9 glass for tower windows, and two oil cans for fog-bell apparatus, supplied. The illuminating apparatus and fixtures have been overhauled, and a pane of lantern glass broken by sea-fowl renewed. The old fog-bell machinery has been removed and its place supplied by a set of Stevens's striking apparatus.

57. *Narrows*.—The slight damage done by storm of 8th September has been repaired. Linings and grate, stage falls, lamps for watch-room, new boat oars, and painter supplied. A new boat is required.

58. *Long Island Head*.—The weather-boards of dwelling have been taken off and reset, packed in paint cement. The old barn has been torn down, and a new one, 12 by 24 feet, with 12-foot posts, built. A padlock for boat-house, rudder braces, paint, manilla, and oars for boat, supplied, and burners repaired. During the storm of September 8 one chimney of dwelling was blown down, breaking a rafter and otherwise damaging the roof. A skylight window was blown in and the inclosure fence damaged. Previously, the boat-house had been damaged by lightning, and the well platform had given out. All the foregoing requirements will receive attention as soon as practicable.

59. *Plymouth*.—The illuminating apparatus and fixtures have been overhauled, the lamps fitted with new supply-tubes, one burner retubed, two globe ventilators made, and seven panes damaged lantern-glass reset. A lucerne, two lamp heaters, a spare pane of lantern glass, and a boat sail, have been supplied. The work of repainting dwelling and setting globe ventilators in place of the old straight ones is in progress.

60. *Race Point*.—The cistern pump and the deck of the bell tower have been renewed, and a hand lantern for use at the fog signal supplied.

61. *Long Point*.—Illuminating apparatus and fixtures overhauled, cistern pump renewed, and timepiece cleaned. The extremity of the point upon which this light stands appears to be rapidly washing away, and it may be necessary at no distant day to move the light further inland.

62. *Mayo's Beach*.—The brick walls of dwelling have been repointed with cement mortar, and all defective bricks relaid. The cistern has been repaired and re-cemented, and an overflow pipe set, front door eased, a mineral knob supplied, window fasts applied to ten windows, planking of platform in rear of dwelling partially renewed, and a section of the inclosure fence renewed, and a gate built. A new boat and stove grate and linings have been supplied, and the illuminating apparatus overhauled.

63. *Billingsgate Island*.—The illuminating apparatus and fixtures have been overhauled, two lamps fitted with cups and plugs, and burners retubed. Repairs, pointing and painting of brick walls of dwelling and tower, repainting of trimmings, window blinds, and tower stairs, resetting

of glass panel in front door, and retopping chimneys, are in progress. The walls of the dwelling have settled slightly, and it is feared that firm foundation was not secured in the sand upon which the station is located.

64. *Sandy Neck*.—The brick wall of easterly end of dwelling has been sheathed outside with boards, or framings nailed to brick-work, clap-boarded and painted two coats white; dwelling window sashes reputtied and redrawn, blinds repaired and fasts renewed; roof repaired, chimney rebuilt, unfinished room in addition lathed, plastered and finished, with chimney, &c.; cellar bulkhead repaired, boat-house roof repaired, lantern door repaired, illuminating apparatus overhauled, and lens cowl supplied; boat repaired, well hangings and cordage and blocks for boat supplied.

65. *Cape Cod Highlands*.—The illuminating apparatus has been overhauled, the timepiece cleaned and repaired; a door lock for assistants' dwelling and a chest of tools supplied.

66. *Nausett Beach*.—The exterior trimmings and interior woodwork of dwelling has been repainted one coat, plastering repaired and locks supplied; two clothes presses set in chambers, and an iron sink with lead pipe spout, wall-paper for two rooms and entry, and thirteen window panes supplied; also a cooking-stove for assistant keeper. The plank platform, 14 by 18 feet, in rear of dwelling, has been renewed and underpinned with stone, and a sink drain built, 108 feet long, 10 by 10 inches square. An addition, 9 by 15 feet, to the barn, and a lean-to shed, $9\frac{1}{2}$ by $18\frac{1}{2}$ feet, have been built, and roof of barn patched with shingles. The parapet wall of the southerly tower has been replastered outside with cement mortar, outer doors of the three towers renewed and fitted with new locks and latches. The post and rail inclosure fence has been rebuilt on two sides of the lot, 973 feet, including a gate, 12 feet, and repaired wherever requiring it on the third side. Seven panes of lantern glass on seaward side cut by blowing sand are to be renewed, and the present valve lamps removed and Franklin lamps substituted.

67. *Chatham*.—The outside plastering of the southerly tower has been removed, all defective brick-work repaired, and the wall replastered with cement mortar. All defective plastering of the northerly tower has been repaired, a galvanized iron ventilator set on the kitchen chimney, all broken glass of the dwelling and tower windows renewed, and inclosure fence repaired; two burners have been retubed, and a cooking-stove and pipe supplied.

68. *Pollock Rip light-vessel*, (No. 2).—The lantern, damaged by collision with a vessel, has been repaired and placed in store, a spare lantern having meanwhile been supplied to the vessel. Four lamps have been fitted with new burners, and, together with a marine clock, new trysail, boat sail, seven inch hawser, deep-sea and hand lead lines, moving swivel and shackles, boat, paints and oils, medicines, and hand pump supplied, and windlass repaired. This vessel is in excellent condition throughout. The Superintendent of the Coast Survey having recommended a change in the position of the vessel, the board, after investigation, authorized it, and she was accordingly moved to the northward and westward of her former position, so as to form a range with the Shovelful Shoal light-vessel and a first class nun buoy, off the broken part of Pollock Rip Shoal, and, with Chatham lights, a range for passing through Pollock Rip Slue, in which position she proves a much more valuable aid to navigation. In a moderately strong gale, on the morning of November 27, 1868, this vessel parted her moorings, and appears to have been adrift some time before it was discovered by those on board. She was blown out to sea, and after ten days, and having made several ineffectual attempts to sail into some harbor, she was fallen in with by the steamer

Kensington, which took her in tow. After the steamer had been fast to her for sixteen hours, the hawser parted. She again made fast, but the hawser would not hold, and, it coming on to blow very hard, the steamer was obliged to abandon her, and she again put out to sea. After being out fourteen days, from the time she broke adrift, she was found by the pilot-boat James W. Elwell, which towed her into Newport Harbor, whence the tender Cactus towed her to her station, she having been supplied with a new set of moorings. Subsequently her lost moorings were recovered by the Cactus, and taken to the depot at Wood's Hole.

69. *Monomoy Point*.—The illuminating apparatus and fixtures have been overhauled and put in good order, and a globe ventilator for the lantern dome has been made to replace the old one. A new boat-house is now being built, and fences repaired.

70. *Shovelful Shoal light-vessel*, (No. 3).—A set of eight new lamps, and eight reflectors, which were on hand, have been supplied; also, new blocks, rigging, hatch-covers, signal lanterns, spyglass, crockery and tinware, medicines, paints and oils, and the iron-work has been repaired.

71. *Handkerchief light-vessel*, (No. 4).—A new windlass purchase, new false stem, deep-sea and hand lead lines, new cordage and blocks for rigging, thirty fathoms chain cable, shackles and chain hooks, and paints and oils, have been supplied; stem and boat required, and new caboose built and supplied with fixtures. To avoid accidents by collision, to which this vessel was greatly exposed, because of vessels attempting to pass to the northward of her, and being driven on her by the currents, the board authorized her removal a short distance to the northward, where she is a little out of the track of vessels, in which position she is much less liable to injury, and is just as efficient an aid to navigation.

72. *Nantucket Great Point*.—One side of roof of dwelling has been re-shingled, and the chimney re-topped. Third-order Funck lamps have been substituted for the old escapement lamps, and various small articles supplied, and repairs made. The lantern-door requires stiffening with angle iron, and a new lens cowl and screws for sash strips of lantern are needed.

73. *Sankaty Head*.—Eight panes of lantern glass, cut too large, and not properly bedded, long since cracked, and recently opened by action of rust in astragals, have been renewed, and a spare pane supplied; and all the requisite small repairs made, and supplies furnished. The lantern deck does not afford sufficient space outside the lantern for safe and convenient footing for the keepers in cleaning the glass, &c., and, instead of the usual lower mullions, the lantern has a flat ring of iron resting on the deck. This has become rusty, and the lower panes of glass are obscured during rain-storms, by spattering from the deck. The lower zone of the lens is sufficiently high above the plane of the deck to admit of measures to effectually remedy the defect, by putting an annular cast-iron deck around it, having flanges to inclose the posts, mullion sills to receive the glass, and a suitable balustrade.

74. *Nantucket New South Shoal light-vessel*, (No. 1).—Through last winter this vessel received all requisite small supplies and repairs, her exposed position demanding the greatest attention, so that she might want for nothing that could contribute to her safety or efficiency. Having been continuously on her station for nearly three years, the board, on the 30th April last, authorized her being brought into New Bedford, Massachusetts, for examination, which was done early in July, when she was found to be very much decayed. She has been completely overhauled, thoroughly repaired, and is now in complete order. She will be at once returned to her station.

75. *Gay Head*.—The barn doors have been renewed, illuminating apparatus overhauled, revolving machinery and timepiece cleaned, boat repaired, and new galvanized iron pipe supplied for lantern stove. The window-frames and blinds of dwelling, parapet wall of tower, and the lantern deck require painting, and some slight additions to the water conductors are needed.

76. *Brant Point*.—The dwelling has been entirely sheathed outside with pine boards, joints rebated, and secured by furring nailed to the brick-work. A storm-house has been built over the front door, out-buildings repaired, cellar-way replastered, and doorway cut between north and south rooms. The mortar in the joints of the tower coping has been raked out to a depth of three inches, and the coping covered on top with coal tar and sand, laid with a wash outward of half an inch. The exterior of dwelling and tower and interior finish of the rooms has been repainted two coats and two rooms papered. The old and troublesome leaks have been stopped, and dampness obviated.

77. *Nantucket Beacon*.—On the 30th June last this beacon was discontinued, it being at so short a distance from the main light, at Brant Point, as to be useless as a range. A greater distance can only be obtained by placing a beacon on the southern side of the harbor, in rear of the main light, to do which would involve a greater expense than the commerce of Nantucket now warrants.

78. *Nantucket Cliff Beacons*.—The scuttle on roof of dwelling has been removed and a glazed skylight set; iron sink and cistern pump set in kitchen; one room repapered; one side of one of the beacons reshingled, and fence repaired.

79. *Bass River*.—The roof of dwelling has been repaired and outside doors repainted, illuminating apparatus overhauled and burner retubed.

80. *Bishop and Clerks*.—The tower wall has been repointed outside with cement mortar, and wherever defective inside has been replastered, and broken window glass replaced. All loose protection stone at the base of the tower have been secured by iron dogs and cement landing platform replanked, outer doors eased, inner door and manhole scuttle rehung. The fog-bell tower has been fitted for the reception of one of Stevens's striking apparatus, by sheathing three latticed windows and setting four glazed windows, changing the upper flight of steps and closing the old weight holes, Stevens's striking apparatus has been substituted for the old fog-bell machinery, removed to the buoy station at Wood's Hole, whence it is to be sent to the light-house depot, Staten Island. The exterior of the bell tower has been repainted one coat, the revolving machinery and timepiece cleaned, and other small but important repairs made; and new sail boat and new stove lining supplied.

81. *Hyannis*.—Wall paper for one room of dwelling, a new spear for yard pump, and an oilcloth for tower landing have been supplied, and cistern pump repaired.

82. *Cross Rip light-vessel*, (No. 5).—The illuminating apparatus and fixtures have been overhauled, seven lamps fitted with new burners, and 12 wick holders supplied; also 15 fathoms chain cable, tools, new caboose and fixtures, galvanized pipe for ditto; crockery and hardware, tinware, paints and oils, cordage for rigging, duck for repairing sails, and some new metal for bottom.

83. *Cape Poge*.—A framed addition of one room, 12 by 13½ feet outside, has been built in rear of the dwelling at each end, with a closet 4 by 4 in one angle; new rooms finished, lathed and plastered, and papered; new work painted three coats; outside and inside of dwelling repainted two coats; storm-house roof repaired, and two 3½-foot iron sinks, a well-

bucket and rope supplied; and boat-house repainted one coat. The illuminating apparatus and fixtures have been put in good order. The site has suffered to such an extent from encroachments of the sea that it has been deemed advisable to make timely provision for removal of the buildings inland, by the purchase of a little more than four acres of land, three and nine-tenths acres adjoining the site, and one-fourth acre at the site of the boat-house, a quarter of a mile from the light-house, and the title papers are in preparation, to be submitted according to law for the opinion of the Attorney General concerning their validity. Immediate necessity of removal is not apprehended, and the light-keeper has been instructed to give prompt notice of further encroachment.

84. *Succomeset light-vessel*, (No. 2).—This is the oldest light-vessel in the district, and is much inferior to the others in general appearance, but in all essential respects is apparently in good order. Eight new lamps have just been sent to the station, and the old ones will be repaired and fitted with new burners for spare lamps. New cordage for rigging, new caboose and fixtures, oil-carrier, oars, hardware, and paints and oils have been supplied.

85. *Edgartown*.—One of the end sills and part of a side sill of dwelling have been renewed; new sills placed under cisterns, and cistern repaired; one room repapered; one window casing taken off and reset; chamber floor taken up in part and relaid; dwelling whitewashed, and outside trimmings and lantern deck repainted; wood-shed and coal-shed have been battened; 50 feet of inclosure fence renewed, and out-building repaired. The bridge leading to the light-house has been repaired, and the stone protection wall along the pile-work topped out from one to two feet, and secured with timbers spiked to the piles for a length of 120 feet, and capstones relaid along the remainder of the wall.

86. *Holmes Hole, West Chop*.—The roof-valley of dwelling has been re-leaded and shingled, front-door steps repaired, door and trimmings and window glass renewed, iron sink set in kitchen, cistern and other pumps put in good order, and pipes adjusted and privy rebuilt. The lightning conductor is now being improved.

87. *Nobsque Point*.—Repairs of wood-shed, barn, and fences are now in progress. A sheet-iron fireboard has been supplied, and illuminating apparatus overhauled.

88. *Tarpaulin Cove*.—The dwelling addition has been re-shingled, windows repaired, and a new cooking-stove supplied. A new boat-house and gate are now being built, and repairs of roofs of dwelling and wood-shed are in progress.

89. *Vineyard Sound light-vessel*, (No. 7).—All the lamps have been repaired; 60 fathoms new chain cable supplied, also glass for lanterns, deck lights, cabin stove and pipe, tin and crockery ware, chain-hooks, cordage and blocks for rigging, tools, paints and oils and medicines supplied, and compass and spyglass repaired.

90. *Hen and Chickens light-vessel*, (No. 8).—Six lamps have been repaired, fitted with new burners, and supplied as spare lamps. Supplied 30 fathoms chain cable, cordage and blocks for rigging, deep-sea lead, new topmast, crockery and tin ware, oil carrier, caboose castings and linings, and repaired cabin skylight, besides sundry small repairs and supplies.

91. *Cuttyhunk*.—Roofs of dwelling and boat-house have been repaired, leaks in easterly end of dwelling stopped with paint cement, sink drain 10×10 inches and 25 feet long, built of plank. Boat moorings, and hinge for boat-house door have been supplied.

92. *Clark's Point*.—A rectangular tower, 11×20½ feet and 8 feet

high, has been built in the northerly staircase tower of the fort adjoining the old site by flooring over the stone-work, carrying up the walls with wood-work, putting on a hipped roof covered with tinned iron, with a circular wooden parapet for the lantern, surrounded with an iron railing. To this the lantern, illuminating apparatus, and fixtures, were removed, and the light exhibited from its new position on the 15th of June last. Six panes lantern glass and an oil-cloth for lantern, a new cooking-stove, and wall paper for two rooms of dwelling, have been supplied. To obviate if possible the danger of breaking the lantern glass when heavy guns are fired in the fort, swing frames for two sides of the lantern are now being made. The old tower has not been torn down.

94. *Palmer's Island*.—The floors and stairs of dwelling have been repainted two coats, cellar windows and cistern pump repaired, missing glass replaced, a boat-house 14 by 27 feet and ways 54 feet long built; winch and fall supplied, and railing of tower walk repaired, and a boat sail and moorings supplied. Repairs of chimneys, attic plastering, and plank walk, damaged by the storm of September 8, are required.

95. *Ned's Point*.—The roof of the covered way has been covered with plastic slate roofing; junction of same with tower and joints of lantern deck packed with paint cement; illuminating apparatus overhauled, and lens fitted to receive Franklin lamps, which was substituted for the old valve lamps. A new entrance gate is required. The stone wall built for the protection of the northerly and northeasterly sides of the site from encroachments of the sea was destroyed many years ago. Until recently the ruins have afforded sufficient protection, and therefore no attempt was made to rebuild it. The sea is now beginning to get behind the stones in several places, and the rebuilding of a part if not the whole of the wall will soon be necessary. During the storm of September 8, a length of 100 feet of the wall on the southwesterly side was destroyed. The ruins, for the present, form a sufficient protection; but the wall should soon be rebuilt. It is proposed to protect the most exposed points by temporary riprap, and to rebuild the wall next season.

96. *Bird Island*.—The wooden steps at rear entrance of dwelling have been removed, and two stone steps set; sink set in porch; one window taken out of rear wall, wall cut down, and door-casing and door set leading to covered way of tower; missing window glass renewed, and inside of cistern recemented; two rooms repapered: woodwork of dwelling, outside and inside, boat-house, well-curb and house over cistern repainted, and outhouses repaired. The brick parapet wall of tower has been sheathed outside with tongued and grooved boards, and painted; illuminating apparatus and fixtures overhauled and put in good order, and revolving machinery cleaned. The boat ways and landing piers have been extended ten feet; new rollers set in ways, and old piers repaired by putting in stone walls instead of timbers, refitting with stone, and protecting exposed points against ice by wooden fenders and planking; 549 lineal feet of the stone wall inclosing the island has been rebuilt from 4 to 7 feet high, and 3 to 5 feet thick, exclusive of backing, and 207 lineal feet, partially relaid, to finish, and plank walk 50 feet long laid from boat-house towards dwelling. During the storm of September 8, 1869, which was of unprecedented severity at this point, the island was completely swept by the sea, submerging and destroying 280 lineal feet of the sea-wall, moving barn, canting boat-house, and carrying away outbuildings, fences and old landing pier at boat-house, covering the boatways with sand, and reducing the station

from a condition of perfect order to that of perfect wreck, or serious damage of almost everything except tower, dwelling, and new landing piers. The new wall referred to above would have withstood any direct assault of the sea, but being submerged, and attacked from the top and behind, and being laid without cement, it could only give way. Orders have been given for such repairs as are immediately indispensable, pending an estimate for thorough repairs. The wall in its present condition affords full protection against wearing away of the island, and its rebuilding will not be recommended until the problem of an effectual protection of the premises from the sea under any circumstances shall have been carefully studied.

97. *Wing's Neck*.—A boat-house and ways are required at this station. The only suitable place for boat-ways in the vicinity of the light-house does not belong to the government, and if occupied, must first be purchased; but as yet no definite information has been obtained concerning the terms upon which this can be done.

Relief light-vessel, (No. 9).—Spare anchors and 75 fathoms chain, cordage and blocks for rigging, new foresail and new caboose and fixtures, iron and tin ware, paints and oils, clock, quadrant, chart and navigator, and five repaired lamps, have been supplied. This vessel is now on the station of the Nantucket New South Shoal light-vessel, where she has been since June 28 last. As soon as she has been relieved by the vessel belonging to the station, which will soon be done, she should be examined, and if found necessary, thoroughly repaired. A "relief" light-vessel for this district is liable to be required at any time for an outside station, and she should be entirely trustworthy. Indeed, to put the matter beyond peradventure, it is proposed to station in this district one of the new first-class light-vessels now under construction intended for relief vessels for outside stations.

BEACONS, (UNLIGHTED.)

All the beacons in the following list are in good condition, unless otherwise stated.

1. *Old Cock, Buzzard's Bay*.—Iron spindle 36 feet high, with open-work cage at top.
2. *Egg Island, Buzzard's Bay*.—A granite cone, with iron spindle, having vane at top.
3. *Range beacon on Fair Haven, Fort Point, Buzzard's Bay*.—A boiler-iron triangular pyramid, 40 feet high.
4. *Cormorant Rocks, to the southward of the entrance of Mattapoisett Harbor, Buzzard's Bay*.—An iron spindle 26 feet high, with cage at top.
5. *Lone Rocks*.—Iron spindle with cage on top, marks northeast entrance to Wood's Hole, Massachusetts.
6. *Collier's Ledge, to mark the entrance to Centerville Harbor, Vineyard Sound*.—A granite base, with iron spindle having at the top a ball and vane.
7. *Great Rock*.—Iron spindle bearing a cage at a height of 26 feet. It marks the edge of the flats making off to the west of Point Gammon, Vineyard Sound.
8. *East end of breakwater*.—A wooden spindle having at top four arms and a cask, east end of Hyannis breakwater.
9. *Sunken Pier*.—A wooden spindle with cask on top, on northeast part of Bass River Bar.
10. *Spindle Rock*.—An iron spindle with cask on top, marks a rock awash at high water, at entrance to Edgartown Harbor.

Billingsgate shoal, old site.—A pyramidal open-work timber beacon, 12 feet square at base, 15 feet high, with mast having 15 feet additional height, and day-mark formed of slats crossing at right angles, is in process of erection, to be known as old site.

11. *Egg Island Rock.*—A wooden spindle, with cask at top, entrance to Wellfleet Harbor.

12. *Duxbury Beacon.*—Granite, square, surmounted by a granite post 4 feet high, painted red.

13. *Breakwater Beacon.*—Square, open-work granite, with wooden spindle surmounted by a cage, all painted black.

14. *Hogshead Beacon.*—An iron spindle with prong, cask on one arm, and basket on the other.

15. *North Beacon.*—Iron spindle with two rounds, one above the other, and at right angles, is placed on the point of the flats at entrance to Scituate Harbor.

16. *South Beacon.*—Iron spindle with two lozenges, one above the other, and at right angles, stands on point of shoal at entrance to Scituate Harbor.

17. *Londoner.*—On Londoner Rock, off Thatcher's Island, (Cape Ann,) is an iron spindle 45 feet high, with an octagonal cage on top.

18. *Point Alderton.*—A square granite pyramid, surmounted by a black cone of stone; it is placed on the shoal which makes out from Point Alderton, about 200 feet from the shore at low tide.

19. *False Spit.*—Granite base, with iron spindle and square cage.

20. *Spit Beacon.*—Square granite pyramid.

21. *Nix's Mate.*—Large, square, granite base, with octagonal pyramid.

22. *Great Fawn Bar.*—Square granite base, and granite cone, with iron spindle and cage on top.

23. *Deer Island Point.*—Square granite pyramid, painted red, on extreme point of Deer Island.

24. *Bird Island Beacon.*—Iron spindle with cage on top; stands on southeast point of Bird Island, on rocks bare at low water but covered at two-thirds flood.

25. *Sunken Island.*—Open-work granite base, wooden spindle, with small, square cage on top.

26. *Pig Rock.*—Square granite pyramid; small wooden staff with small, square cage.

27. *Halftide Rock.*—A wooden spar 40 feet high, with barrel day-mark, has been set, and secured to the stub of the stone beacon formerly marking the danger, and braced with four iron braces.

28. *Marblehead Rock.*—Of granite, in the form of a truncated cone, with wooden spindle.

29. *Little Aquavitae.*—A wooden spar, with two prongs at top, stands on a rock which is dry at half ebb.

30. *Great Aquavitae.*—Granite, surmounted by a wooden staff and cage. To be left on starboard hand in going up South Channel to Salem.

31. *Hardy's Rock.*—A wooden spindle with iron braces; has two triangles at top. Rock dry at half tide.

32. *Bowditch Beacon.*—Large, triangular pyramid of granite, bearing a wooden spindle with black cage on top. The condition of this beacon has not changed since the date of last annual report. The displaced stones seem to be firmly held in the work. No repair can be effected short of tearing down and rebuilding the whole beacon. Although in its present condition the structure looks badly, yet it is quite as efficient an aid to navigation as if a large sum had been spent in its repair. It is

not proposed to take any steps in the matter so long as the beacon remains as it is.

33. *Halfway Rock*.—A truncated pyramid of granite on a square base, surmounted by three spars meeting at top, and bearing a keg, formerly marked this rock, which is itself sufficiently large and high to serve as a mark. The old beacon was destroyed some years ago, and it is not proposed to rebuild it.

34. *Little Haste*.—A 35-foot wooden spar, with cask on top, marks this rock; dry at low water. It is off the northwest side of Great Haste Ledge.

35. *Abbott's Monuments*.—Square, granite, surmounted by a wooden staff, with open-work square cage on top, painted red.

36. *Monument Bar*.—Square crib-work filled with granite, with a wooden shaft bearing a square cage painted black.

37. *Ramshorn*.—Square crib-work filled with granite; wooden staff painted black; top like a sugar loaf.

38. *Lobster Rocks, Beverly Harbor*.—Stone, with a wooden spindle.

39. *Black Rock, Gloucester Harbor*.—An iron spindle with oblong cage.

40. *Harbor Rock, Gloucester Harbor*.—An iron spindle with open-work ball; all painted black.

41. *Five Pound Island, Gloucester Harbor*.—Granite base with iron spindle and ball, painted red.

42. *Lobster Rock, Annisquam*.—Square, open work, granite beacon; top black.

43. *Lane's Point*.—Square wooden beacon.

44. *Point Neck Rock*.—Iron spindle, painted red; ball on top.

45. *North Pier, Newburyport Harbor*.—Is built of hewn timber laid up as a lozenge-shaped crib, and filled with stone; shows about four feet above high water.

46. *South Pier, Newburyport Harbor*.—Exactly like the preceding.

BUOYS ACTUALLY IN POSITION.

Care and diligence has been exercised in keeping the buoys in order. During the year 129 buoys were carried away, or moved from their stations, not quite one-third of which were recovered. In the gale of the 8th September many buoys were lost or moved out of place; but they have all been replaced, and at this time it is believed that every buoy in the district is in its proper place.

Harding's Ledge bell buoy was taken into port, put in good order, supplied with 15 fathoms of new chain cable, and returned to its station.

A bell buoy and seven spar buoys have been placed near Hyannis, and in Centerville Harbor, Cape Cod.

A spar-buoy has been properly located to mark the bar off Billingsgate Island; also off Bunkin Island, Boston Harbor, at the entrance to Weir River, and two additional spars to mark dangerous rocks in the same river.

SPARE BUOYS AND APPURTENANCES.

Three hundred and sixteen spar buoys, including rings and staples, were purchased for this district, and fifty granite sinkers ironed ready for use. These, together with the nun and can buoys previously on hand, and thirty-four new iron buoys recently sent there, are believed to be sufficient for the wants of the district for the coming year. It is proposed, however, to obtain and put in store at each of the buoy de-

pots fifty granite sinkers, and in addition a few ballast balls, at the buoy depot at Wood's hole.

TENDERS AND SUPPLY VESSELS.

The tender Wave has been constantly employed in attending to the numerous buoys in the northern part of the district, carrying coal and lime to the light-houses and other duties for which her services are required. She has met with no accident, and required no repairs to her hull, but has been supplied with a new mainsail, flying jibboom, fore topmast, some new rigging, a new caboose, some crockery and tin ware, and her boats have been repaired, and she is to have a new foresail.

The steam tender Cactus, when not under repair, was steadily kept at work. This vessel supplies all the light vessels in the district, and sights their moorings once a quarter, which, with the care of the buoys and light-houses in the southern part of the district, requires her to be in constant service. Her machinery is much worn, and her hull not sufficiently staunch for the duty required of her. In making a passage from the Nantucket New South Shoal light-vessel to Nantucket, on October 17 last, she was overtaken by a gale, and was in imminent danger of foundering. The sea broke over her bulwarks, doing considerable damage, and the water gained upon both her pumps till within a few inches of her fires and had not the gale abated somewhat, which enabled her to gain the lee of the island, she must have gone down within a short time. Some portion of her hull is constantly giving out, and the expense of keeping her in repair is quite large. She cannot be relied upon to perform the duties much longer, and ought to be replaced by a new and staunch steamer, for which an estimate is submitted.

The supply vessel Guthrie, having been thoroughly repaired, and the Pharos furnished with new standing rigging, her stern and cabin repaired and a storehouse built on deck, the two were sent to the light-house depot at Staten Island, which is to be their station in future.

BUOY DEPOTS.

Some slight repairs have been made to the roof and doors of the sheds at the Gulf Island depot. Nothing more is required at present.

Wood's Hole.—The contract work of improvement of the buoy depot has been completed, comprising the removal of the old buoy shed to a new position, construction of 96 lineal feet of retaining wall, 320 lineal feet pile wharf from 16 to 30 feet wide, piles iron sheathed, frame building, shingled all over and painted 18 by 77 feet, divided into chain shed, blacksmith's shop, cooperage, paint store and office, all with suitable doors and windows; frame building, 25 by 42 feet inside of posts, planked inside and sheathed with boards outside of posts, shingled roof with gable windows, doors, and painted; wooden water tank of 10,000 gallons capacity, roofed over and painted; and filling and grading the lot, to the amount 500 cubic yards earthwork.

The bar at the entrance of the harbor does not afford water enough to admit the passage of the relief light-vessel at all times of tide, and it is proposed to dredge across the same 475 feet long, 50 feet wide, and an average of two feet deep; also to build a fence around the premises, a portable crane, and smith's and other tools, and to set up the hot-air engine of the old Cape Ann fog signal, for pumping purposes.

THIRD DISTRICT.

In this district, extending from Gooseberry Point, Massachusetts, to include Squam Inlet, New Jersey, and Lake Champlain and Hudson River, there are—

Light-house and lighted beacons.....	94
Light-vessels in position.....	7
Light-vessels for reliefs.....	2
Beacons unlighted.....	26
Spindles.....	14
Buoys actually in position.....	343
Spare bnoys to supply losses, and for reliefs.....	205
Supply vessels for delivering supplies to lights on the Atlantic and Gulf coasts..	2
Tenders, (steam).....	1
Tenders, (sailing schooner).....	1

98. *Brenton's Reef light-vessel*, No. (11.).—A new lantern has been supplied to this vessel, and the other one repaired. A new jib and some articles of equipment, cooking utensils, &c., have been supplied during the past year. A new and more powerful pump is required to free the vessel from water, which leaks in. Several panes of lantern glass, a set of oil butts, and a new cooking-stove, are needed in place of broken and worn-out glass, butts, and stove.

Castle Hill, east side of entrance to Newport Harbor and Narragansett Bay, Rhode Island.—Applications have been made at various times in the past, and renewed this year, for a light-house and fog signal on Castle Hill, to guide vessels, especially in thick and foggy weather, into Newport Harbor and Narragansett Bay. After a careful examination of the locality, and a full consideration of the whole subject, it is recommended that an efficient fog signal be authorized for this point, which it is believed will, with the existing lights and other aids to navigation in the immediate vicinity, subserve the desired purpose. The land upon which this fog signal must necessarily be placed, if authorized, being held at a certain value, an estimate for an efficient fog signal, including the cost of the land, is submitted in the annual estimates.

99. *Beaver Tail, Rhode Island.*—A new third-order Funck lamp has been placed in this light as a substitute for the Wagner lamp heretofore in use. Considerable damage was done at this station by the late gale, (September 8.) A working party is now employed repairing the damage and attending to some other small repairs. The fog signal, which has been for many years in use at this station, being scarcely fit for further use, a new and improved apparatus is under construction, and will be placed during the autumn.

100. *Lime Rock, Newport Harbor, Rhode Island.*—During the recent gale (September 8) the chimney of the keeper's dwelling was blown down, and the roof of the dwelling damaged. A working party is now employed making the necessary repairs.

101. *Newport harbor light, Rhode Island.*—About one-third of the slate roof was torn off during the gale of the 8th September, and the iron railing on the breakwater, and the keeper's boat were damaged during the gale by a vessel which parted her moorings. The damage has been repaired, and the station is in good order and condition.

Rose Island Beacon light, Narragansett Bay, Rhode Island.—The lighted beacon authorized by Congress July 28, 1868, to be established on Rose Island, is now in progress on the south end of the island, and will be ready for exhibition at an early day.

102. *Dutch Island Narragansett Bay.*—The wood work at this station has been thoroughly painted during the year, and the light is well kept.

The gale of September 8, 1869, destroyed the boat-ways, damaged the boat-house, and threw down a part of the sea-wall and fences.

103. *Poplar Point, Rhode Island.*—This station is in the same dilapidated condition that it was last reported to be in. It is one of the oldest in construction and character of lantern, and it is recommended that it be entirely rebuilt, for which an estimate is submitted in the annual estimates.

Hog Island Reef, Narragansett Bay.—A reef runs out from Hog Island to the main channel, rendering navigation difficult and dangerous. To prevent, as far as possible, loss of life and property at this place, the steamboat company owning and running a regular line of steamers between New York, Newport, and Fall River, keep a light-vessel stationed there at the cost of the company. Should Congress see fit to relieve this company of this unusual expense, which it incurs for the benefit of others as well as for itself, by authorizing the building of a light-house with a protecting pier, in about six feet water on the reef, the estimated cost would be forty-five thousand dollars.

104. *Prudence Island, Rhode Island.*—A new stove and fixtures for the tower have been supplied. The boat has been repaired, and new sails supplied. The gale of the 8th September, 1869, caused considerable damage to the keeper's dwelling, which is now being repaired. The tower is in good condition. The outhouses were destroyed by the gale, and will be rebuilt.

105. *Bristol Ferry, Rhode Island.*—A new lamp has been fitted. Two rooms in the tower have been lined with ceiling boards, and a new ladder provided.

106. *Warwick Neck, Rhode Island.*—The outhouses at this station have been demolished, and the roof of the keeper's dwelling badly damaged by the recent gale. The line fences were blown down, and a great portion of the bank washed away. A working party is now engaged making the necessary repairs.

107. *Conimicut Point, Rhode Island.*—This tower was completed, and the light exhibited for the first time as a substitute for the Nayat Point light, on the night of November 1, 1868. A fog-bell, struck by clock-work machinery, is attached to the tower. A temporary landing place was erected at the tower, which was totally destroyed by the late gale. A wharf of a substantial character is now under construction, and the enrockment for the protection of the tower against running ice is being enlarged. Considerable damage was done by the late gale to the exposed portion of the grounds at Nayat Point, where the keeper of Conimicut light resides.

108. *Point Judith, Rhode Island.*—This station has been thoroughly renovated, and a new lantern and deck plate fitted. It is now in good condition, and does not need anything.

109. *Block Island, Rhode Island.*—This station was damaged by the late gale. The slate of the roof has been repaired, and three plates of glass, broken in the lantern, replaced. The station is now in good condition.

110. *Watch Hill, Connecticut.*—The condition of this station is the same as reported for the last two years. It is proposed to make the repairs and renovations then recommended without avoidable delay.

111. *Montauk Point, east end of Long Island, New York.*—A new floor was laid in the dining-room of the keeper's dwelling, and proper ventilation provided. The outhouses were destroyed and the keeper's dwelling badly damaged by the late gale. The repairs are now being made.

112. *Stonington, Connecticut*.—No repairs have been needed. The station is in good condition.

113. *Eel Grass Shoal light-vessel*, (No. 12.) *off Mystic, Connecticut*.—No repairs required during the past year. New stove-pipe, grates, and linings for the stove; four new oars, and one pair new pump boxes, have been supplied. The vessel is in good condition.

114. *Morgan's Point, Long Island Sound*.—This station has been rebuilt. The old dwelling has been taken down, the cellar filled, and the grounds properly graded. The wooden addition to the old dwelling has been converted into a stable, and the outbuildings removed. The fences have been repaired, and new gates fitted. This station is now in excellent order and good condition, and the keeper takes good care of everything at the station.

115. *North Dumpling, Fisher's Island Sound*.—A new and improved apparatus for striking the fog-bell has been put up at this station, in place of the one hitherto in use. As reported last year this station is in a dilapidated condition and needs rebuilding, for which an estimate will be submitted in the annual estimates.

116. *New London, Connecticut*.—The fog-signal engine has been repaired. The dwelling needs repainting next year. The station is in good condition. The authorities of the city of New London have erected the fences on both sides of the new road which was authorized to be opened across the light-house grounds.

117. *Bartlett's Reef light-vessel*, (No. 13) *New London, Long Island Sound*.—The lamp-burners have been renewed; a new stove-pipe and head, and some small articles of ship-chandlery, and cooking utensils, have been supplied during the year. One of the boats is under repair, and a new one authorized in the place of one unfit for further repair or use. The general condition of the vessel is good.

Race Rock, Fisher's Island Sound.—Congress appropriated July 28, 1866, ninety thousand dollars for the erection of a beacon without a dwelling for keepers, on what is known as "Race Rock," at the entrance to Fisher's Island Sound. This very serious obstruction to navigation in Long Island and Fisher's Island Sounds was supposed at the time this appropriation was made to be a large bowlder, over which it was proposed to erect a tower for the light, and to erect a suitable dwelling for the keepers on the south end of Fisher's, distant about three-fourths of a mile from the rock. A careful and minute survey of this locality having developed the fact that Race Rock is not a single bowlder of great size, a different plan becomes necessary. It is proposed, should Congress see fit to make the requisite additional appropriation, to construct a protecting pier of granite and to erect thereon a keeper's dwelling two stories high and octagonal in plan, with a circular stairway in the center, to be carried a sufficient height above the roof of the dwelling to support the lantern and illuminating apparatus; the whole to be of granite, and fire-proof. A powerful fog signal will be attached. The advantages of this plan over the original one, even if the foundation had not been found to be different from what it was supposed to be, will be apparent. The protecting pier will be of a greater diameter and increased stability, and consequently more effectually resist the force of the storm-waves and pressure of packed floating ice in winter. The attendants upon the light and fog signal will be always at hand to attend to their duties, which could not be insured if they were compelled to live on the island nearly a mile distant, particularly in the winter, when the ice is brought by the tides in immense packs and with great force through this comparatively narrow channel for passing vessels. The estimated cost

of this important aid to navigation on the present plan, as detailed in general terms, would be \$200,000, of which \$90,000 are already available, leaving \$110,000 to be provided by Congress. The amount now available is, it is believed, sufficient to carry the work above water, and it is proposed to commence the foundation early next spring.

118. *Little Gull Island, main entrance to Long Island Sound from the east.*—The new tower, keeper's dwelling, and fog-signal building are nearly completed, and the new 2d-order light will be exhibited before the close of the year.

119. *Gardner's Island.*—No repairs have been needed at this station. A new stove for warming the tower has been furnished. It is proposed to make some alterations in the lantern and to place a fog-bell during the next year at this station. The fog-bell at present in use at the Little Gull Island station will be available for this purpose.

120. *Plum Island.*—The rebuilding of this station, for which a special appropriation was made March 3, 1869, is now far advanced in progress and will be roofed in by the end of the season for outdoor work.

121. *Cedar Island, Sag Harbor, Long Island.*—The rebuilding of this station is completed and old structure removed. A 5th-order lens will be placed in this tower as a substitute for the 6th-order which was in the old tower.

122. *Saybrook, Connecticut.*—Extensive repairs are in progress and will be completed before the close of the season at this station. The sea-wall which protects the site was damaged by the gales of last winter, and is now being repaired.

123. *Calves' Island, Connecticut River.*—This station is in good condition. No repairs have been made.

124. *Brockway's Reach Connecticut River.*—The protecting pier authorized by Congress July 20, 1868, has been completed, and the station is in good condition.

125. *Devil's Wharf Connecticut River.*—No expenditure on account of repairs, and nothing required at this time.

126. *Cornfield Point light-vessel, off mouth of Connecticut River: (No. 14.)*—This vessel is in good condition. A new stove for the cabin, some tools, and shackle-pins have been supplied. Several of the lamps and burners have been repaired.

127. *Horton's Point, Long Island, New York.*—This station is in the same general condition that it was at the date of the last report. It needs repairs very badly, and an estimate will be included in the general estimates.

128. *Faulkner's Island.*—This station is in the same condition that it was at the date of the last report, with the addition of washing away, during the last winter, of the island on the east side, which renders it necessary to take steps for protecting it. These washings have been observed for several years, and they have now reached a point when they ought to be arrested. For this purpose it is proposed to build a sea-wall of granite at the base of the bank in front of the light-house tower and buildings, for which an estimate will be submitted.

129. *New Haven, Connecticut.*—The tower and keeper's dwelling are in the same condition as last year. The repairs recommended, and a new fog signal to supply the place of the one now in use which is worn nearly out, will be estimated for in the annual estimates.

130. *New Haven Long Wharf, Connecticut.*—This station requires painting, and is otherwise in good order and condition.

131. *Stratford Point, Long Island, New York.*—The condition of this light station is the same as at the date of the last report. It is not in a

fit state for repair, and true economy requires that it should be rebuilt whenever an adequate appropriation can be obtained from Congress.

132. *Stratford Point light-vessel*, (No. 15,) *Long Island Sound*.—This vessel is in good condition. New fire-brick and grates for stove, new pump boxes, various small articles of ship chandlery, and new chains for lantern, have been furnished during the past year.

133. *Bridgeport Beacon, Connecticut*.—No repairs have been made at this station. A new boat has been furnished and the boat-ways repaired. The recommendation of last year to replace the present inefficient iron structure by one of stone capable of withstanding the shocks of storm waves and ice, and be at all times reliable, is renewed, and the same estimate will be included in the annual estimates.

134. *Oldfield Point, Long Island Sound*.—The reconstruction of the buildings at this station has been completed, and the station is now in good order and condition.

135. *Black Rock, Fairweather Island, Long Island Sound*.—In last year's report it was recommended to rebuild this station, and place the tower and keeper's dwelling in close connection at the site of the present tower. The estimated cost of rebuilding is again submitted in the annual estimates. An appropriation was made, March 2, 1867, for repairs at this station, of \$3,400, which was found upon a careful examination of the premises to be totally inadequate, and none of it has been used.

Penfield Reef, Long Island Sound.—The erection of a light upon this dangerous reef in Long Island Sound was recommended last year. The estimated cost of a suitable structure for so exposed a position is fifty-five thousand dollars; which is again submitted for the consideration of Congress.

136. *Eaton's Neck, Long Island, New York*.—This station has been lately put in good condition. A new lamp has been introduced in place of the old one. A fog signal will be established at an early day.

137. *Lloyd's Harbor, Long Island Sound*.—This station is in good condition and no repairs are needed.

138. *Norwalk Island, Long Island Sound*.—The repairs and renovations provided for by the appropriation of March 2, 1867, have been completed, and the station is now in good condition.

138. *Great Captain's Island, Long Island Sound*.—The repairs and renovations provided for in the appropriation of March 2, 1867, have been completed. The boat-house which was built about forty years since is of no further use, and a new one will be erected at the foot of the drift-way deeded to the United States with the site at the time the purchase was made.

140. *Execution Rocks, Long Island Sound*.—The authorized repairs and renovations have been completed. A new fog-trumpet has been placed at this station, as a substitute for the fog-bell formerly in use there. Chain for boat davits, a few tools, and a stove and fixtures, have been supplied during the year. Additional protection against the action of the sea and ice is required on the east side of the tower. The enrockment made there many years ago having settled considerably, it does not afford adequate protection to the tower and keeper's dwelling, especially during the severe storms of winter and the heavy pack ice brought against it by the tides. It is proposed to further protect the site and building by laying large blocks of granite of the proper shape compactly together.

141. *Sand's Point, Long Island*.—This station has been put in complete order lately. It is now in good condition.

Hart Island, Long Island Sound.—An appropriation was made April

7, 1866, of \$6,600, for the erection of a light at this point. The owner of the island being unwilling to sell the requisite quantity of land for this light station, for such a sum as the Board would have been authorized to give, proceedings were instituted in conformity to law for condemning the land. The award of the appraisers for five acres of land was \$25,000, a sum far exceeding the entire appropriation, and, in the opinion of the Board, far beyond its intrinsic money value. Having made further examinations, it is found that the south end of the island, upon which the light would necessarily be placed, if placed on the island at all, is continually washing away, and unless it is protected by an expensive sea-wall, a light-house could not remain there very long. The end of the reef, (in six feet water,) which runs out from the southern end of the island, would afford a good foundation and proper site for the erection of a stone structure similar to those already erected at points on the Hudson River. The estimated cost of the proposed structure and apparatus, complete in all respects, is \$45,000, in addition to the \$6,600 already appropriated.

142. *Throgg's Neck, Long Island Sound.*—The authorized renovations and repairs at this station are now in progress and will be completed at an early day. A new and more efficient fog-bell, operated by a hot-air engine, has been put up in place of the old one.

North Brother, Long Island Sound.—The new light-house authorized to be erected at this place is now completed. The light will be ready for exhibition by the first of November.

143. *Great West Bay, sea-coast of Long Island.*—No repairs have been needed at this station. A new stove and pipe, six panes of plate glass for the lantern and some window glass for the keeper's dwelling, have been supplied during the year.

144. *Fire Island, sea-coast of Long Island.*—The tower at this station is in good condition. The keeper's dwelling and fences need some small repairs. The illuminating apparatus has been overhauled and adjusted. A Funck lamp has been fitted in place of the mechanical lamp hitherto in use. Boat has been newly rigged and moorings supplied. Lanterns, curtains and fixtures, new pump, tool chest and necessary tools, have been furnished.

145. *Sandy Hook light-vessel, (No. 16.)*—A new two-inch riding chain has been supplied to this vessel. Plate glass for lanterns, a cooking-stove and fixtures, new rope, six new oil butts, and some few articles of ship chandlery have been supplied to this vessel during the year. The vessel is in good condition and well cared for.

Wreck of the Scotland; temporary light-vessel off Sandy Hook, (No. 20.)—This is still considered necessary to mark the remains of the wreck of the *Scotland*. The decks have been recalked; a new boat and fixtures, and new davits, have been supplied to replace those destroyed by the late storm.

146. *Highlands of Navesink, (two lights,) entrance to New York Bay.*—The stone-work is being repointed; some slight repairs have been made; a new Funck lamp has been fitted at the north light.

147. *Sandy Hook main light, entrance to New York Bay.*—This station is in good condition. The pump has been repaired and the stable rebuilt. The premises are well cared for by the keepers.

148. *East Beacon, Sandy Hook.*—During the gale of September 8, 1869, the north point of Sandy Hook was washed away to an extent which may ultimately render the removal of the beacon necessary. Protection to the point, to prevent further washing, would be very expensive and of doubtful results. The present fog signal at this point is in good con-

dition, and has been run without difficulty by the present keeper. It is a very important aid to navigation during fogs and snow-storms, and no efforts will be spared to keep it in good working order.

149. *West Beacon, Sandy Hook.*—This beacon has been set upon oak piles, extending from twenty-five to thirty-five feet into the sand, and it is now considered safe against the danger of being washed away. A new lantern has been fitted—the tower lined inside and repainted.

One or more permanent beacons in the lower bay of New York.—An appropriation was made March 2, 1867, by Congress, of \$45,000, "To enable the Light-house Board to erect in the lower bay of New York one or more permanent beacons." This sum is wholly inadequate to the accomplishment of the purpose for which this appropriation was made. An appropriation of \$200,000 was made March 3, 1837, "for a light-house on Flynn's Knoll, near Sandy Hook, to be built under the direction of the Engineer Department." On the 3d of March, 1851, Congress made another appropriation of \$30,000 "for a light-house on Flynn's Knoll." For reasons heretofore communicated to Congress by those charged with the erection of the proposed light on Flynn's Knoll, the light has not been built. It is believed that Flynn's Knoll is the only obstruction to navigation in the lower bay of New York which is not properly marked; and as Congress has, by three separate and distinct appropriations, manifested its desire for the erection of a light-house there, the Board has no doubt but that a suitable structure, to serve as a range with the Princess Bay light, and also to mark this dangerous shoal, which lies between the two principal channels leading up New York Bay, can be built for the sum originally appropriated in 1837, viz: \$200,000 in addition to the \$45,000 now available. This light, placed so as to make a range with Princess Bay light for the deepest water of Gedney's Channel, would enable vessels of the heaviest draught to cross the main bar, and reach a safe anchorage at night in the lower bay, in addition to its usefulness in marking a shoal upon which there is only nine feet of water at low tides.

150. *Conover Beacon, New York Bay.*—The authorized necessary repairs and renovations for this station will receive early attention, other and more pressing work having prevented its being attended to sooner.

151. *Chapel Hill Beacon, New York Bay.*—This station is in good condition. No repairs have been made during the past year.

152. *Point Comfort Beacon, New York Bay.*—The authorized repairs were made last year. The station is at present in good condition.

153. *Waackaack, New York Bay.*—A stoop to the front door has been put up and some slight repairs made to the dwelling. The station is in good condition.

Cliffwood Point, Raritan Bay, New Jersey.—A light, to be established at this point, was petitioned for, and an estimate submitted last year for the amount required. The attention of Congress is again invited to the subject.

154. *Elm Tree Beacon, Staten Island.*—This station is in good condition. No repairs have been made during the year.

155. *New Dorp Beacon, Staten Island.*—No repairs needed.

156. *Princess Bay, Staten Island, New York.*—The new dwelling for the keeper has been completed, the old house torn down, and the material used in erecting a substantial barn and stable. The fences have been put in proper order, and the grounds graded. The recent heavy gales have damaged considerably the jetties, constructed of logs, for the protection of the beach in front of the light-house site. The one near the line fence is nearly demolished, and the stone washed away. The

high bank is wearing away rapidly by the action of the sea, tides, and heavy rains. It is considered of the greatest importance to lose no time that can be avoided in providing the necessary and appropriate means for the protection of the site of this important light station, for which purpose an estimate is submitted.

157. *Fort Tompkins, Staten Island.*—The authorized works at this station will be commenced early next spring.

158. *Robbin's Reef, New York Bay.*—No repairs have been made during the year, and none are required. A number of panes of glass have been cracked, which will be replaced before winter sets in. Some necessary tools, a stove-grate, lining, and lids, have been furnished during the year.

159. *Bergen Point N. J.*—This station is in good condition, and no repairs needed.

160. *Corner Stake Beacon N. J.*—No repairs needed at this point.

161. *Passaic, Newark Bay, mouth of Passaic River, N. J.*—This structure will be repaired, and the masonry of the protection repointed.

162. *Elbow Beacon Shoal in Newark Bay.*—No repairs needed at this station.

163. *Stony Point, Hudson River.*—The dwelling has been repaired, and the outhouses rebuilt. The fog signal-bell, operated by clock machinery, requires new striking apparatus.

164. *West Point, Gee's Point, Hudson River, N. Y.*—No repairs needed at this station.

165. *Esopus Meadows, Hudson River, N. Y.*—As reported in the last two annual reports, this station is in an exceeding bad state, and the only economical remedy is to rebuild the light-house. The wooden pier upon which this light house stands is in such a delapidated state that it is feared the whole will be taken away by the ice and freshets during the coming winter. The keeper's house is unfit for occupancy in the winter, even if the foundation pier were safe enough to justify its occupancy. An estimate for the construction of a light station similar to those recently built at different points on the Hudson River is submitted in the annual estimates.

166. *Rondout, Hudson River, N. J.*—The wood-work has been painted outside and inside during the past year. The station is in good order.

167. *Saugerties, Hudson River, N. Y.*—The reconstruction of the buildings at this station is in progress and will be completed during the present working season.

168. *Four Mile Point, Hudson River, N. Y.*—Some small repairs are needed, but will be made before the end of the working season.

169. *Coxsackie Hudson River, N. Y.*—The rebuilding at this station has been completed this season, and the station is now in good condition.

170. *Stuyvesant, Hudson River, N. Y.*—The rebuilding at this station is completed, and the old buildings are being removed, and the grounds put in order.

171. *New Baltimore, Hudson River, N. Y.*—A portable beacon, upon the general plan, is constructed for this station.

172. *Five Hook Island, Hudson River, N. Y.*—A portable beacon, upon the general plan, will be placed at this station.

183. *Coeyman's Bar, Hudson River, N. Y.*—A portable beacon will be placed at this station.

Le Roy Hook, Hudson River, N. Y.—A portable beacon will be placed at the end of the dike recently completed by the Engineer Department.

174. *Schodack Channel, Hudson River, N. Y.*—A portable beacon will be placed at this station.

Nine Mile Tree, Hudson River, N. Y.—A portable beacon will be placed at this point in the center of the new dike.

175. *Cow Island, Hudson River, N. Y.*—A portable beacon will be placed on the end of the dike in place of the present lake.

176. *Van Wie's Point, Hudson River.*—A lantern and lens, of the portable beacon pattern, will be substituted for the present lantern on the stone beacon.

Parada Hook, Hudson River.—A temporary stake light is kept on the end of the dike recently completed by the Engineer Department. A portable beacon will be placed there at an early day.

Upper end of Stone Dike, Hudson River.—A portable beacon will be placed at this point.

Cuyler's Dike, east side Hudson River.—A portable beacon will be placed at this point.

WHITEHALL NARROWS AND LAKE CHAMPLAIN.

1. *Whitehall Narrows.*—Portable beacons will be substituted for the nine stake lights in the Whitehall Narrows at an early day. The additional lights authorized by appropriation approved March 3, 1869, will be constructed on the plan of the portable beacons.

Middle-ground, mouth of Whitehall Narrows.—It has been recommended heretofore that a light station be established upon the Middle-ground, at the mouth of Whitehall River, Lake Champlain, similar to those recently erected on the Hudson River. No appropriation having been made for this object, the former estimate is again submitted in the annual estimate.

2. *Crown Point, Lake Champlain.*—Some slight repairs and painting needed, and will be attended to at an early day.

Barber's Point, Lake Champlain.—It is recommended that an appropriation be made for a light-house at this point, for which an estimate is submitted.

3. *Split Rock, Lake Champlain.*—The boat-house at this station having been destroyed by a freshet, a new one will be built.

4. *Juniper Island, Burlington, Vermont.*—A new stone has been furnished and some small repairs made. The station is in good condition.

5. *Burlington Beacons Breakwater.*—The northern end of the Burlington breakwater having been recently extended, the temporary light, distant six hundred feet, will be substituted by a proper structure for the beacon light on the end of the breakwater.

Colchester Point, Lake Champlain.—A light has been asked for at this place. It appears from an examination of the chart that a light placed upon one of the islands, lying southwest of South Hero Island, would answer the purpose designed, and would also serve as a general guide to navigators on the lake. The determination of the exact site for the proposed light, if authorized, might, with propriety, be left for a careful personal examination of the locality. It is recommended that an appropriation be made for the erection of a light-house on Colchester Reef, South Hero Island, or in the vicinity.

Bluff Point, Valcour Island, Lake Champlain.—The recommendation for a light at this point is renewed, and an estimate submitted.

6. *Plattsburg Beacons, Lake Champlain.*—No repairs have been made at this station.

7. *Cumberland Head, Lake Champlain.*—The new tower and keeper's

dwelling have been completed, the old buildings removed, and the grounds graded.

8. *Point au Roche, Lake Champlain.*—No repairs have been made at this station, and none needed at this time.

9. *Isle La Motte, Lake Champlain.*—It is proposed to erect in the place of the present stone pyramid a keeper's dwelling with a lantern on top, from which to exhibit the light.

10. *Windmill Point, opposite to Rouse's Point, Lake Champlain.*—Some small repairs are needed to the lantern and keeper's dwelling at this station.

UNLIGHTED BEACONS AND SPINDLES.

1. *South Point, Rose Island, Narragansett Bay.*—This is a granite structure, surmounted by a spindle and cage, in good condition.

2. *Halfway Rocks, Narragansett Bay.*—A spindle with square cage, in good condition.

3. *Bullock's Point, Providence River.*—This beacon is being further protected by placing stone around it.

4. *Pawtucket Beacon, Providence River.*—Built of stone, and is in good condition.

5. *Saben's Point, Providence River.*—It is proposed to erect at this place a stone beacon similar to the one at Bullock's Point.

6. *Punham Beacon, Providence River.*—A stone beacon with vane and ball on top, in good condition.

7. *Fuller's Rock, Providence River.*—It is proposed to construct a stone beacon at this point.

8. *East Lime Rock, Newport Harbor.*—A granite structure, surmounted by an iron spindle and cage, in good condition.

9. *Muscle Bed, Bristol Ferry, Narragansett Bay.*—This stone beacon having been recently destroyed by a storm, it is now in process of reconstruction.

10. *Bordeo's Flats, opposite Fall River.*—This beacon is in course of construction.

11. *Castle Island, Bristol Harbor.*—A stone beacon surmounted by a black ball; some repairs and further protection to the base needed.

12. *Allen's Rock, Warren River.*—Stone beacon in good condition.

13. *Spindle Rock, West Channel, Narragansett Bay.*—An iron spindle with square wooden cage, in good condition.

14. *White Rock spindle, channel leading into Weekford Harbor.*—On a rock bare at low water, surmounted by an iron spindle, in good condition.

15. *Spindle Rock, Greenwich Harbor.*—An iron spindle with square cage, in good condition.

16. *Hen and Chickens, Long Island Sound.*—An iron spindle supporting a square cage painted black. The cage has been carried away and will be restored at an early day.

17. *Branford Reef Beacon, Long Island Sound.*—Granite beacon surmounted by an iron shaft bearing a black day mark, in good condition.

18. *Black Rock Beacon, Long Island Sound.*—An iron pile beacon with cage on top, in good condition.

19. *Watch Hill spindle.*—Stands on a rock which is bare at low water, and is surmounted by a cage; in good condition.

20. *Sugar Reef Beacon, Fisher's Island Sound.*—An iron pile beacon, with cage-work day-mark, in the form of a cone; the day-mark having been destroyed is now being replaced.

21. *Lord's Channel*.—An iron spindle, square cage-work day-mark. The day-mark has been carried away, which will be replaced very soon.

22. *Catumb Reef, Fisher's Island Sound*.—An iron pile beacon, 25 feet high, with square cage-work day-mark. The day-mark has been destroyed, but will be replaced very soon.

23. *Latimer's Reef spindle*.—An iron spindle, surmounted by a square cage-work day-mark. The cage-work has been carried away, but will be replaced soon.

24. *Ellis's Reef spindle*.—An iron spindle, with square cage-work day-mark, in good condition.

25. *Groton Long Point*.—An iron spindle bearing a cage-work in the form of an inverted cone, in good condition.

26. *Sea Flower or Potter's Reef Beacon, Fisher's Island Sound*.—This is a very important mark for Fisher's Island Sound; it is recommended that a granite structure be erected as a support to the boulder in which the spindle is placed.

27. *Black Ledge Beacon, Fisher's Island Sound*.—An iron shaft, carrying a cage-work day-mark, formed by two cones connected at the vertices; in good condition.

28. *Whale Rock Beacon, Mystic Harbor*.—An iron shaft bearing a globe-shaped cage-work day-mark; in good condition.

Spindle on the Whale entrance to Mystic River.—This spindle has been carried away by the ice. It will be replaced.

29. *Crook's spindle*.—An iron spindle, with a keg on top, in good condition.

30. *Saybrook Beacon, mouth of Connecticut River*.—A stone beacon erected on Saybrook Bar. This beacon having been built many years ago on a wooden foundation, it has been found necessary to reconstruct it upon a stone foundation, which is now in progress.

31. *Quix's Ledge, entrance to New Haven, Conn.*—An iron spindle with a cask on the top of it, placed on a rock, which is uncovered at low water, and is in good condition.

32. *Southwest Ledge spindle, off New Haven, Conn.*—A wooden mast resting in an iron socket, and supporting a square wooden cage-work day-mark. The mast has been again carried away, and will be replaced at an early day.

33. *Stratford River Beacon*.—This beacon has been rebuilt in a very substantial manner.

34. *Outer Beacon, Bridgeport Harbor*.—In good condition.

35. *Inner Beacon, Bridgeport Harbor*.—In good condition.

36. *Southport Beacon, (creek.)*—Granite beacon in good condition.

37. *Southport Beacon, (breakwater.)*—Granite beacon in good condition.

Great Reef off Norwalk Island.—A reef which is bare at half tide: needs to be marked by a beacon or spindle.

38. *Norwalk Beacon*.—A Granite structure, supporting a shaft and day-mark of iron, in good condition.

39. *Sand Spit, on the south end of the sand spit at Sag Harbor, Long Island*.—An iron shaft, with cage-work day-mark, braced to four iron piles by iron braces. This beacon having been damaged by the running ice, it is proposed to set the shaft perpendicularly, and protect by four courses of granite, clamped to it.

Oyster Pond Point, Plum Gut, entrance to Gardner's Bay.—A shaft was erected at this point some years ago, which has been destroyed by the running ice. This reef is bare at low water, but at other times of tide is a serious danger to navigation. It is recommended that a substantial stone beacon be erected upon it, at a cost of about \$5,000.

Long Beach Bar, entrance to Greenport.—As reported last year, it would seem to be necessary to mark this point by a granite beacon.

40. *Romer Beacon on the west of Romer Shoal, New York Bay.*—This beacon is built of cut granite, conical in shape, and supports a wooden cage-work. A portion of the foundation of this beacon on the east side has been undermined by the sea, which will receive early attention to prevent any serious injury to the structure which remains perpendicular.

41. *Mile Reef, Killvankull.*—Is a sheet iron beacon filled with concrete and secured to a granite base; it is conical in shape, and supports an iron shaft with an iron cage-work day-mark on top; it is in good condition.

42. *Success Rock, Long Island Sound.*—An iron shaft fifteen inches in diameter, to bear an iron cage-work day-mark, is ready for placing as soon as the hole now being drilled is completed. The hole for this shaft will be four and a half feet deep. The drilling is nearly finished.

Relief light vessel, (No. 17.)—This vessel is kept at the buoy wharf at New London, Connecticut, in readiness for service as a relief for light vessels breaking from their moorings or those needing repairs. Some small repairs are needed, and will be commenced soon.

BUOYS.

Buoys have been placed to mark Crow Shoal in Gardner's Bay, Sheep's Head Rock, entrance to Greenport, Long Island, and a first-class buoy on the east side of the main open ship-channel into New York Bay.

The buoys in Pawtucket River and in Lake Champlain have been well kept by the contractors. The buoys in the Hudson River have been kept as heretofore, under contract, and all the other buoys in the district have been attended to by the tenders. A number of buoys have broken adrift during the year, which were invariably replaced promptly.

Spare buoys for reliefs and to supply losses.—Spare buoys at the different depots have been kept in proper repair, and in readiness for use.

BUOY DEPOTS.

The buoy depot wharf at New London, Connecticut, has been extended and put in good condition. The buoy depot on Goat Island, in New York Harbor, is in good condition.

Black Rock Depot, Connecticut.—The wharf and buildings authorized at this place will be commenced at an early day.

TENDERS.

The steam tender Putnam has been attached to and employed in this district since December, 1868. This vessel has been kept in good repair, is well adapted to the service, and has been constantly employed in the transportation of supplies, building materials, in inspecting lights, and looking after the buoys. The headquarters of this vessel are at the Staten Island depot, when not employed actively.

The sailing tender (schooner) Sunbeam is employed mainly in the eastern part of the district, with headquarters at Newport, Rhode Island. The great number of buoys in Long Island Sound and tributaries, and the waters of Narragansett Bay, and the large number of lights to be visited with supplies, keep this vessel constantly and usefully employed. This vessel is very old, and requires frequent repairs. It is very important that a steamer of small tonnage and light draught should be substituted as a measure of economy, and to insure greater efficiency in the service.

LIGHT-HOUSE BOARD.

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SUPPLY-VESSELS.

The supply-vessels (schooners) Pharos and Guthrie are laid up, when not employed in delivering oil and other annual supplies, at the Staten Island depot.

These vessels deliver supplies to the lights south of the capes of Virginia during the winter months, and to those north and east of the Chesapeake during the summer months. The Pharos, while lying at anchor in the harbor of New Bedford, Massachusetts, on the 8th September, and during the heavy gale, was damaged considerably by the dragging of a vessel into her. The necessary repairs are in process of being made.

The Guthrie having completed the deliveries of supplies, will be put in order for the coming winter voyage to the southern coast.

DEPOT AT STATEN ISLAND, NEW YORK.

The oil vaults have been completed, and the supply of oil for the present year stored therein. They seem to be admirably adapted to the purpose designed.

The building for workshops has been under construction, and is now nearly completed. It will be ready for occupation before the close of the season.

The work on the office building has been continued. The first story is nearly completed, and the iron beams of the second floor are laid. It is expected that the building will be roofed in before winter fairly begins.

Basin for light-vessels, supply-vessels, and tenders.—For want of funds (which were estimated for last year, but not appropriated by Congress,) the plans adopted by the Board for the construction of these basins were not carried out. Estimates are now submitted for only that portion of the work which is most desirable. They include the cost of constructing an open wharf, with sheds, on the northern boundary of the premises, and a wharf covered with sheet piling in front of the basin.

The following is a statement of the business of the depot for the year ending September 30, 1869. A comparison of this statement with that of last year will show the great increase.

But for this depot, much of this business would have been scattered through the several districts, and would have been conducted at much greater expense, the benefit and economy of concentration being just as apparent in the light-house establishment as elsewhere.

Number of packages, &c., received at and shipped from Staten Island light-house depot during the year ending September 30, 1869.

	Boxes.	Packages, cans, &c.	Barrels.	Total.	Increase in 1869.
Received	1, 276	1, 627	2, 498	5, 401	2, 144
Shipped	1, 153	1, 417	2, 465	5, 035	2, 711
Total	2, 429	3, 044	4, 963	10, 436	4, 855

REPORT ON THE FINANCES.

Lens apparatus and lanterns received at and shipped from Staten Island light-house depot during the year ending September 30, 1869.

	Lens apparatus.									Lanterns.		Total.
	1st order.	2d order.	3d order.	3½ order.	4th order.	5th order.	6th order.	Steamer lenses.	Range lights.	Light-house.	Light-vessel.	
Received.....	4	2	4		2	3	3	10	5	1		34
Shipped.....	2	1	3	2	1	4	1	9		2	1	26
Total.....	6	3	7	2	3	7	4	19	5	3	1	60

Buoys and appendages received at and shipped from Staten Island light-house depot during the year ending September 30, 1869.

	Can buoys.			Nun buoys.			Spar buoys.	Sinkers.			Ballast balls.			Total.	
	1st class.	2d class.	3d class.	1st class.	2d class.	3d class.		1st class iron.	2d class iron.	3d class iron.	Stone.	1st class.	2d class.		3d class.
Received							110				25				135
Shipped	6	2	21	5	15		26	6	34			6	44	20	185
Total	6	2	21	5	15		136	6	34		25	6	44	20	320

Articles manufactured or repaired in the workshop at Staten Island light-house depot during the year ending September 30, 1869.

	Lenses.	Lamps.	Lamp burners.	Miscellaneous articles.	Total.	Increase.
Manufactured.....	6	81	287	583	957	434
Repaired.....	4	54	17	97	172	61
Total.....	10	135	304	680	1,129	495

FOURTH DISTRICT.

In the fourth district, embracing the aids to navigation from Squam Inlet, New Jersey, to and including Delaware Bay, River, and tributaries, and Metomkin Inlet, Virginia, there are—

Light-houses and lighted beacons.....	18
Beacons unlighted.....	None.
Light-vessels in position.....	2
Light-vessel for relief, (building).....	1
Buoys in position.....	82
Spare buoys on hand.....	239
Tenders, (steam).....	None.
Tenders, (sailing schooner Spray).....	1

The following is a statement showing the operations in the fourth district during the past year, the present condition of existing aids to navigation, the requirements for their improvement, and what additions are necessary to render navigation safe and easy:

177. *Barnegat, N. J.*—The work in progress at the date of the last

report, of constructing jetties of brushwood, and depositing stone along the beach, was completed for the season on the 8th of November last. In 1868, 1,220 tons of stone were deposited along the beach and in the jetties. A number of these jetties, which had been constructed during the previous years, have been repaired, and sixteen new ones built. Early in July last the necessary steps were taken to extend the protecting works at this station. Nine new jetties have since that time been built, and repairs made upon part of those constructed during the previous years. A strong crib-work pier has been placed at the western terminus of the works, connected to the solid beach by a jetty formed by digging out the sand to low-water mark, stakes driven four feet deep into the solid sand, and then filled in with brushwood and well ballasted with stone. This jetty is eight feet wide, extending back into the solid beach sixty-five feet from high-water mark. The crib-pier on the outer end is composed of pine logs, from ten to twelve inches in diameter, crossed at right angles, bolted together, and each course filled in with stone; the face, sides, and top planked, and the whole length outside of the high-water mark (twenty-five feet long) forms a strong barrier against floating ice on the ebb tide, and serves well for a landing-place. Six hundred and seventeen tons of stone have been deposited along the beach, on the pier and in ballasting the brushwood jetties. The effect produced by the work done this season at the eastern end of the protecting cribs has been very great, and is entirely satisfactory. The level of the beach front of the light-house site has been raised five feet, and the ordinary high-water line has extended out into the bay fifty-five feet. The present high-water line is now where the low-water line was in 1867. The work thus far has proved to be an entire success. Measurements are made semi-monthly along the beach to determine the extent of washings and accretions.

The wooden lining and part of the watch-room having been injured by fire the last year, they have been repaired, and covered with sheet zinc to prevent a recurrence of the accident. The keeper's dwelling has been painted inside and out. Some small repairs have been made to insure the regular and uniform movement of the revolutions of the illuminating apparatus. The glazing of the lantern has been attended to, and a new pump, with a check valve, put in the assistant keeper's cistern. The outbuildings of the station having fallen into decay, and the sites encroached upon by drifting sand, they have been removed to better positions and thoroughly repaired. Everything at this station is in good order, and the light well kept.

178. *Tucker's Beach, N. J.*—This station is in good order and condition. No repairs have been needed during the past year.

179. *Absecom, Atlantic City, N. J.*—The tower has been cement-washed; the iron stairway of the tower, the lantern plates, the dwellings, passage-way between the tower and dwelling, and the picket fence in front of the light-house lot, have been painted; sash cords of the windows renewed, a new wooded curb fitted, gravel placed around the buildings to arrest the drifting sand, and copper-wire gauze fitted outside of the lantern glass to protect it from wild fowl. The tower and buildings are in good order and condition. During the month of February last a careful topographical survey was made of the ocean front, extending from Illinois avenue, in Atlantic City, along the shore to the inlet, thence along the inlet to the railroad wharf; and in May last a careful hydrographical survey was made of the inlet and the ocean in front of the light-house site. The semi-monthly examinations and measurements of the beach in the vicinity of the site, to determine the extent

of abrasions and accretions, are continued and reported as in past years. The reports of the last year showed slight changes along the beach on the ocean and inlet fronts, but were of a serious character to the light-house site. In the late storm of last September, however, considerable cutting away of the beach directly at the point of the inlet was done. Should the autumn and winter storms cause additional abrading of the beach of the light-house lot, it will be necessary to adopt measures for arresting further encroachments. The examinations and measurements will be continued at regular semi-monthly periods, and also after every heavy storm.

180. *Five-fathom Bank light-vessel* (No. 18) off *Cape May, N. J.*—No repairs have been made upon this vessel during the past year. Her condition, however, will make it necessary to have her relieved by the relief light-vessel now being built at Philadelphia, under contract, and thoroughly repaired. She has been well kept.

181. *Cape May, N. J.*—No repairs have been made at this station this year. The station is in good order and condition. The keeper's dwellings and the stairways of the tower will need painting next year.

182. *Cape Henlopen, Delaware.*—The keeper's house has been painted inside, and small repairs have been made to the cistern pumps. The large sand-hills which are about the tower and dwellings frequently change in shape and elevation, but no serious inconvenience has resulted to the station so far.

183. *Cape Henlopen Beacon, Delaware.*—Small repairs have been made to the chimneys and water-tanks during the year. The station is in good order and condition.

184. *Delaware breakwater, Delaware.*—A new lantern has been fitted. The roof of the house, the tower above the roof, and the lantern parapet have been renewed. A new pathway has been made around the building. A number of joists have been placed under the main floor of the building, and the wooden water-tanks painted. The revolving machinery has been repaired.

185. *Brandywine Shoal, (iron screw-pile,) Delaware Bay.*—This structure has been thoroughly painted, inside and out, by the light-keepers during the present year. It is in good order and condition.

186. *Maurice River, N. J.*—The plank platform has been renewed, the steps of the front door repaired, a new galvanized iron conductor-pipe fitted from the wash-room to the sink, and the buildings painted outside. A new lantern will be put up next season to take the place of the very old one now in use. The station is in good order and condition.

187. *Egg Island, N. J.*—No repairs have been made during the year, and some are needed at this time. The gradual encroachments of the water upon the site of the boat-house may render it necessary to remove the house further back next year.

188. *Upper Middle or Cross Ledge light-vessel, Delaware Bay.*—No repairs have been made upon this vessel during the current year. This vessel was repaired during the previous year. The vessel, moorings, and illuminating apparatus are in good order and condition.

189. *Mahon's River, Del.*—No repairs made and none needed at present. Small repairs may be required to be made next year.

190. *Cohansey, N. J.*—The repairs in progress at the date of the last report were completed last November. They consisted of a new roof on the main building, kitchen, and oil-house; new galvanized iron gutter and conductor fitted, and small repairs upon the plank platform. These buildings will require to be painted next year.

191. *Bombay Hook, Del.*—The repairs in progress at the date of the last report were completed in last October, consisting of a new roof to the main building and kitchen, new galvanized iron water-gutters and conductors, repairs to cistern, with new pump and check-valve; fence repaired on the front of the lot; picket fence repaired; a new roof to privy; replastering and new sill to front of piazza. The dwelling was painted last year inside and out. The smoke ventilator on the kitchen chimney will be renewed this season.

192. *Reedy Island, Delaware Bay.*—The repairs this year have been the brick pavement in the base of the tower taken up and replaced upon properly packed earth; new steps made from the platform to the ground; the boat-house removed to a safer position. The lens apparatus has been overhauled and put in proper order.

193. *Christiana, Delaware.*—The plastering of the ceiling of the kitchen has been repaired; the old gas-house adjoining the keeper's dwelling has been removed; a new slate roof has been put upon the dwelling and kitchen, and the tower covered with slate from the roof of the main building to the lantern deck. New steps to the house, and the platform repaired. A part of the brick-work of the cistern, being defective, has been removed and rebuilt; all the buildings have been painted inside and out. It is recommended that a suitable wharf be built at this station for landing light-house stores, buoys, and their fixtures; anchors, and cables, &c., for light-vessels; and for the preservation and protection of the relief light-vessel. A small storehouse, buoy shed, &c., and for the preservation and protection of the supplies, buoys, &c., of the district. This, it is believed, is the most eligible position in the district for this purpose; and as the land and water front belong to the light-house establishment, it will save the cost of a site elsewhere, and relieve the board from the necessity which now exists of renting a wharf and storehouse near this light station. An estimate will be submitted with the annual estimates for the erection of this wharf, &c.

194. *Fort Mifflin, Delaware River.*—Small repairs have been made at this station during the year. Four wooden fenders, with iron straps, have been placed at the corners of the pier, and the picket fence repaired. In July last a vessel having run into the pier, it became necessary to make some additional repairs at small cost. This light is placed on a pier in the Delaware River, built of timber, wharf fashion, and in too slight a manner to withstand the heavy shocks of vessels which frequently run or drift into it in passing up and down the river. These timbers are now very rotten, and no longer safe as a foundation for the light-house buildings. A new pier and light-house buildings should be built next year upon a plan that will insure greater stability and consequent economy of annual maintenance, and for that purpose an estimate will be submitted with the annual estimates.

195. *Fenwick's Island, Delaware.*—The keeper's dwelling has been painted inside and out, and the fences will be put in good order this season. The light is well kept.

196. *Assateague, Virginia.*—The lantern glass has been protected by wire gauze screens against wild fowl. The station is in good order and condition.

DAY BEACONS.

There are no unlighted beacons in this district.

BUOYS.

Buoys actually in position at Barnegat Inlet, Little Egg Harbor Inlet, Absecon Inlet, and Great Egg Harbor Inlet, on the Atlantic coast of

New Jersey; those in Delaware Bay and River, at Chincoteague Inlet, Virginia, and on Fenwick's Shoal, and Winter Quarter Shoal, have been kept in their proper positions, and changed and painted as required during the year.

SPARE BUOYS.

The spare buoys are in good order and condition at the respective buoy stations where houses and sheds are provided for their preservation and protection against the weather, viz: at Barnegat, Little Egg Harbor, Absecon, (Atlantic City,) Great Egg Harbor, Wilmington, Delaware, and at Chincoteague, Virginia. These stations have been kept properly painted, and in good order, and the buoys in readiness for use.

A first-class iron can-buoy has been placed to mark the southwest point of the "overfall" at the entrance to Delaware Bay, and a buoy has been placed over the boiler of the wrecked steamer Cassandra, which lies off Brigantine Beach on the Atlantic coast of New Jersey.

BUOY TENDERS.

The sailing schooner Spray is the only vessel employed on light-house service in this district. This small vessel has been during the last, as in previous years, employed continuously in raising, replacing, and looking after the buoys in Delaware Bay and River, and in delivering supplies to and in the inspection of lights. Small repairs have been made during the last year, and the vessel is at this time in thorough repair, and in good order.

At the close of the last report, the steam tender Putnam was undergoing extensive repairs at Wilmington, Delaware, in this district. The repairs were completed towards the close of November, and the vessel dispatched to New York for duty in the third light-house district. The sailing tender Narragansett has been repaired in this district during the past year. The steam tender Geranium, of the eighth light-house district, is now undergoing repairs at Camden, New Jersey, in this district.

Two steam tenders and one light-vessel are being built at Philadelphia, in the district, by contract. One of the tenders is planked, with guards on, and deck nearly laid; is nearly ready for calking, and will probably be launched in three weeks. The other tender is in frames, keelson in, and bilge strokes and clamps of deck and wales being put in. The engines and boilers are in good progress. The light-vessel is planked, upper deck laid, rail and bulwarks on, and the calking commenced. It is expected that these vessels will be completed within the prescribed contract time, and ready for service by the first of the ensuing year.

FIFTH DISTRICT.

The fifth district extends from Metomkin Inlet, Virginia, to include New River Inlet, North Carolina, as well as Chesapeake Bay and its tributaries, and Albemarle and Pamlico Sounds. In the district there are—

Light-houses and lighted beacons	66
Light-vessels	3
Beacons, (unlighted).....	84
Buoys, (actually in position)	483
Spare buoys, to supply losses.....	313
Tenders, (steam)	1
Tenders, (sailing)	None.

The operations of the year, as well as the present condition and requirements of the aids to navigation in the district, are as follows:

197. *Hog Island*.—The lighting rod on the tower has been fitted with a new point, and a Franklin lamp has been substituted for the constant, level lamp previously used. It is proposed to build a boat-house, put a picket fence around the keeper's dwelling, and to make some slight repairs to the dwelling itself.

198. *Cape Charles*.—Light-house tower, outbuildings, and fences, whitewashed two coats; lantern painted inside and out; also inside of dwelling-houses, porches, and balustrades; doors repaired, and new well-curb.

199. *Cape Henry*.—The bridge extending from the tower to the keeper's dwelling is broken down and requires rebuilding, and step-ladders for inside and outside of lantern are needed; six panes of plate-glass have been supplied for lantern.

200. *Willoughby Spit*.—Light-vessel, (No. 21,) showing a single light, was temporarily placed on this station. She was withdrawn on the 4th November, 1868, and No. 23 substituted. The latter vessel exhibits two lights, the original characteristic of this station. Before being put upon the station, light-vessel No. 23 was hauled out on the marine railway, sheathed with yellow metal, a new lantern mast and a for-try-sail mast provided; several new planks (wales) put on her sides; the sides and decks thoroughly calked and painted; tops of lantern-houses covered with canvas; a new caboose and fixtures, and new bedding supplied. Since being on the station one of the boats has been repaired, and a boat sail provided, and the lanyards which connect the rigging to the sides of the vessel have been renewed. She is now in good condition.

201. *Old Point Comfort*.—The beacon-light at this station, being no longer of any service to navigation, has been discontinued. The tower of the main light has been whitewashed, lantern painted two coats, inside and out, glass set and window frames and sash painted; plastering of dwelling repaired, most of which had been shaken down by the concussion caused by firing of heavy guns in the fort and vicinity; porches, steps, railing, and gates painted; doors and locks repaired; cistern cleaned out, and a coat of cement wash given it; new lead pipe put in; floor of back porch relaid, and plank walks repaired; woodshed built and painted; kitchen, outbuildings, and fences whitewashed.

202. *Craney Island*.—Galvanized iron pipe and other fixtures have been supplied for cooking-stove. The station is in good order.

203. *Naval Hospital*.—Lantern needs slight repairs. It is proposed to substitute a new lens, with Funck lamp, for the illuminating apparatus now used at this station.

204. *White Shoals*.—A new boat sail, clock, and material for boat falls, have been supplied. The station is to have a new lens, fitted with Funck lamps. This is a screw-pile light-house of the oldest and most inferior design. It is now canted to the westward about one foot from the vertical at the top, and the whole structure is in a very unsafe condition. Should the coming winter be severe enough to form much ice, it is tolerably certain that the light-house will be destroyed thereby, the ice of 1867 being the immediate cause of its present condition. It is proposed to rebuild it after the design of the light-house lately erected on Deep Water Shoal, and an estimate of the probable cost of doing so is submitted for the consideration of Congress.

205. *Point of Shoals*.—Outside of house and the iron-work, including inside and outside of lantern, have been painted; balustrade repaired,

and middle post supporting keeper's dwelling spliced; new boat-falls and oars have been supplied, and a new lens, fitted with Funck lamps, will be substituted for the present illuminating apparatus. This light-house, built upon the same plan as the last-named, is at present in an unsafe condition, and it is probable that if the coming winter should be severe enough to form heavy ice, the light-house will be carried away when the ice breaks up. The lives of the keepers should no longer be jeopardized in this structure, and an estimate is accordingly submitted for an appropriation for rebuilding it upon an improved design.

206. *Deep Water Shoals*.—The roof of the keeper's dwelling requires slight repairs. After these are made and a new boat supplied to the station, it will be in good order.

207. *Jordan's Point*.—The house has been painted outside and in, glass set, outbuildings and fences whitewashed, plank walk laid, and bell tower painted. A new fog-bell was supplied in March last, to take the place of the old one which had been cracked. Some slight repairs are needed to the lantern.

208. *Cherrystone*.—The iron-work was hammered and cleared of rust, and afterwards painted two coats. Outside of keeper's dwelling painted, most of it two coats; and lantern, inside and out, two coats; deck repaired and painted two coats; glass reset in dwelling, and doors, locks, &c., repaired.

209. *Back River*.—Generally in good condition. A lightning rod is required for the keeper's dwelling.

210. *York Spit*.—Light-vessel No. 24, which was on this station, was withdrawn in September for the purpose of having a new lantern-mast put in, and No. 21 sent to take her place. As soon as the repairs are completed No. 24 is to be again put on the station. A screw-pile light-house is to be constructed this winter, and in the spring of next year erected at the station, when the light-vessel will be permanently withdrawn.

211. *New Point Comfort*.—The illuminating apparatus has been repaired. The water-conductors need repairing, and the keeper's dwelling should have a lightning conductor.

212. *Wolf Trap*.—Light-vessel No. 22, occupying this station, was temporarily withdrawn in December last, taken to Norfolk and hauled out on a marine railway for examination. It was found to be necessary to completely resheath her with yellow metal, and to put composition plates upon the stem and forward end of the keel to prevent injury thereto by the mooring cables. Repairs were made to her decks, waist, port-shutters, berth-deck, plank-shear, chain-plates, and to her boats; the rigging refitted, thoroughly calked throughout, and a new cooking stove and new bedding supplied. She was supplied, also, with a twenty-eight hundred pound mushroom anchor, and ninety fathoms of one and three-fourths inch chain cable, for use in case of emergency. Being in readiness for her station she was taken in tow by the navy tug Periwinkle, the services of which were courteously given for the purpose, and on the 24th February, 1869, remoored in her position. It is proposed, early in the coming spring, to erect upon the shoal now marked by this vessel a screw-pile light-house, preparation for which will be made during the winter. Upon the completion of the light-house the light-vessel will be permanently withdrawn.

213. *Stingray Point*.—Material for boat's falls have been supplied. A new boat is required.

214. *Windmill Point*.—This station was formerly occupied by a light-

vessel, but it was determined to substitute a light-house on screw-piles. The iron work of the foundation was accordingly contracted for, and completed in October last, when it was stored at the Lazaretto light-house depot until this spring. Meanwhile the wood-work was prepared at the Lazaretto shops, and on the 4th May, 1869, the entire light-house, together with all accessories required in erecting it, and a suitable working party to do the work, were shipped on two schooners to the site the structure was to occupy. The exact position to be occupied by the light-house was fixed on the 10th May, and the work of putting it up began. It was continued without serious interruption until its completion, about the middle of August. Five to seven hours were required, with powerful levers, to make the iron screw-plies penetrate to the prescribed depth of six feet. The plan of the light-house is precisely the same as of that erected at Smith's Point last summer. It is provided with a fog-bell and machinery which strikes uniformly once every fifteen seconds. The iron work of the foundation is painted red, and the superstructure a straw color, as was the light-vessel which it replaced. The light-house having been completed, its light was exhibited for the first time on the night of September 1, 1869, and light-vessel permanently withdrawn.

215. *Watt's Island*.—A cooking-stove and fixtures, and a new boat and fittings have been supplied. A boat house is required

216. *Jane's Island*.—Two plates of glass have been set in the lantern to replace others broken by wild fowl. The station is in good condition.

217. *Somers's Cove*.—In good condition.

218. *Smith's Point*.—One plate of glass set in lantern to replace one broken by wild fowl; manilla rope for boats, three plates glass for lantern, and a few minor supplies have been furnished. On the night of the 1st September, 1869, the character of the light was changed from fixed white to revolving white, with intervals of twenty-five seconds.

219. *Fog Point*.—In good condition.

220. *Clay Island*.—The dwelling needs repairing.

221. *Point Lookout*.—The dwelling requires repairs, and a fence to inclose the garden is needed.

222. *Hooper's Straits*.—In good condition.

223. *Cove Point*.—The fog-bell machinery has been repaired, and a new crank fitted. The plastering of the dwelling requires repairs.

224. *Sharp's Island*.—New boat-falls and stove-pipe supplied. The station is in good condition.

225. *Thomas's Point*.—New fencing is needed, and the interior of keeper's dwelling requires repairs.

226. *Greenbury Point*.—Keeper's dwelling needs slight repairs.

227. *Sandy Point*.—The revolving machinery has been sent to the Staten Island light-house depot, and after repairs, returned in good order. Repairs of considerable extent are required at the station.

228. *Seven Foot Knoll*.—Thoroughly scraped and painted throughout. A new boat was supplied, but afterward lost. Another new boat has been authorized, and will soon be supplied.

229. *North Point*.—In good condition.

230. *Fort Carroll*.—A new cooking-stove has been supplied. The station is in good condition.

231. *Hawkins's Point*.—This iron screw-pile light-house was completed and lighted on the evening of November 1, 1868. A new boat is to be supplied.

232. *Leading Point*.—Was completed and lighted on the evening of November 1, 1868.

233. *Lazaretto Point*.—Plastering throughout dwelling repaired and whitewashed; doors, windows, sashes, and frames repaired, and entire house painted, outside and in, two coats; steps, pump, and curbing of well repaired; brickwalks repaired, outbuildings and fences whitewashed, gutters and spouting repaired, glass reset, tower whitewashed, and lantern painted inside and out. A fog-signal, to consist of a five-hundred-pound bell, struck by Stevens's apparatus, has been ordered for this station.

Bloody Point and Love Point.—Lights on these points seem to be required, and estimates of their cost are submitted. The building of these light-stations was recommended in the last annual report, but the requisite appropriations were not made by Congress.

234. *Pool's Island*.—Is in good condition.

235. *Turkey Point*. In good condition.

236. *Fishing Battery*.—The platform around keeper's dwelling needs repairing.

237. *Havre de Grace*.—A new lens, with Funck lamps, will be supplied to this station.

238. *Piney Point*.—In good condition.

239. *Blakistone's Island*.—In good condition.

240. *Lower Cedar Point*.—In good condition.

241. *Upper Cedar Point*.—In good condition.

242. *Fort Washington*.—Complaint having been made of the inadequacy of this light, it is proposed to improve it.

243. *Jones's Point*.—The fencing needs repairing, and a lightning rod should be provided for the dwelling.

244. *Bowler's Rock*.—In good condition.

245. *Bodie's Island*.—This light-house was entirely destroyed by the rebels. Commerce requires that at least three lights should be established between Cape Henry and Cape Hatteras, in which case Bodie's Island is not in exactly the right place, and it is therefore not proposed to rebuild the light-house.

Light-house at False Cape, or vicinity.—To properly light the coast between Cape Henry and Cape Hatteras, as stated above, three light-houses are required, of which one should be at this point. The board desires to express in the strongest terms its opinion of the great necessity for this light, as well as the two following. Probably no aids to navigation are more imperatively demanded than these. The distance between the lights at Cape Henry and Cape Hatteras is about one hundred and twenty miles, and it is safe to say that *each year*, for many years, the value of the property lost by shipwreck between these limits would have sufficed to build a dozen such light-stations, not to mention the great loss of life that has occurred. An estimate of the probable cost of the proposed light-house is submitted, and the attention of Congress respectfully invited to the matter.

Light-house at Paul Gamie's Hill, or vicinity.—See remarks above.

Light-house at Chicamacomico, or vicinity.—See remarks above.

246. *Cape Hatteras*.—Under the act of Congress approved March 3, 1868, appropriating the sum of \$80,000 for rebuilding the light-house, a working party was organized in October, 1868, and on the 19th started for Cape Hatteras to commence operations, arriving there on the 4th November. Suitable buildings for workmen's quarters and mess-room were erected; a blacksmith shop built; a house in which to store cement and other perishable materials put up; two derricks erected; a wharf built on the south side of the island, distant $1\frac{1}{4}$ miles from the station, this being the nearest point accessible to the scow lighters; two decked

scows and one open one, built to serve as lighters, and a small boat and crane on wharf built for unloading heavy stone. Also, a tram railway, of Peteler's design, laid from the wharf to the light-house, upon which to transport materials. These preparations having been made, and the materials beginning to arrive, work was commenced upon the foundations of the new tower. The site selected bears north by east 600 feet distant from the old tower, and is therefore as near it as it well could be. The sailing directions will be very slightly affected if at all. It is on the general level of the beach, and therefore is secure from the destructive action of the wind, which has always so seriously threatened the foundations of the old tower, and to counteract which very heavy expense was incurred through many years. The site is also above the highest level of the sea, and so far removed from the water line as to render it safe from encroachments of the sea. The foundation consists of two thicknesses of yellow pine timber, each 6 by 12 inches, laid cross-ways, close together, and immediately upon the sand, at a depth of six feet below the surface of the beach. This places the timber-work below low-water level, and to accomplish it required the use of a coffer dam, inclosing the foundation pit, and powerful steam pumps to keep it clear—an assurance that the timber will be always covered with water. Upon these timbers is laid a massive octagonal foundation, composed of large blocks of granite laid in cement mortar, as rubble masonry, the interstices being filled with smaller stone of the same kind. At the proper height, octagonal plinth courses of cut granite were laid, and above that the cut granite quoins and brick paneling, according to the design, were commenced, and the work has proceeded until, at the latest dates from there, the masonry had reached the height of the fifth course of quoins, and the stoop had been laid. The tower itself will consist of a frustum of a right cone of 150 feet in perpendicular height, resting upon an octagonal base of 24 feet in height, and 45½ feet in diameter at the lower plinth course. The foundation is of rubble granite; the plinth courses, quoins, and cornice, of cut granite, and the rest of the structure of brick and iron. The whole will be surmounted by a lens of the first order, the focal plane of which will be 180 feet above the ground, and about 184 feet above the sea. When completed it will be the most imposing and substantial brick light-house on this continent, if not in the world. The flash of its lens should be seen from the deck of a vessel at a distance of more than 22 nautical miles.

247. *Hatteras Beacon*.—This station is to be supplied with new lamps of the Funck pattern.

248. *Ocracoke*.—The slight repairs required at this station have been made, and it is now in fine order.

249. *Southwest Point Royal Shoals*.—Screw-pile light-house; iron work cleaned of rust and painted; outside of house and outside and inside of lantern painted, as well as lantern deck and balustrade; glass reset, and material for boat's falls supplied.

250. *Northwest Point Royal Shoals*.—Screw-pile light-house; iron work cleaned of rust and painted; roof of house and inside and outside of lantern painted, and lantern platform repaired.

251. *Harbor Island*.—Screw-pile light-house; entire outside and inside of house and lantern painted.

252. *Brant Island*.—Screw-pile light-house; iron work cleaned of rust, and painted; house painted outside, and lantern painted outside and in. Funck lamps are to be supplied.

253. *Neuse River*.—Screw-pile light-house; iron work cleaned of rust by hammering, and afterward painted; outside and inside lantern

painted; also, lantern deck and balustrade; reset defective window glass. The boat has been repaired, and a new sail and material for boat's falls supplied. Funck lamps are to be supplied.

254. *Pamlico Point*.—Tower, dwelling, and outbuildings whitewashed; lantern painted inside and out; platform from house to tower repaired, and new railings put up; reset all defective glass.

255. *Long Shoal*.—Screw-pile light-house; cleaned rust off iron work and repainted it; outside of house, and lantern deck and balustrade painted; material for new boat's falls supplied.

256. *Roanoke Marshes*.—Screw-pile light-house; painted iron work, house, lantern, balustrade, and deck.

257. *Croatan*.—Screw-pile light-house; painted iron work, deck, lantern, balustrade, and entire outside of house; a new sail and material for boat's falls supplied.

258. *North River*.—Screw-pile light-house; iron work painted; also, outside of house, lantern deck, roof, and balustrade.

259. *Wade's Point*.—Screw-pile light-house; iron work; outside of house, roof, lantern deck, roof and balustrade painted.

260. *Roanoke River*.—A new cooking-stove and materials for boat's falls supplied.

261. *Cape Lookout*.—The dwelling-house having been in a very bad condition, has received extensive repairs, such as new weather-boarding on three sides; sills spliced; large portion of rooms replastered; window frames, sashes, and doors repaired; glass reset; painted entire inside of house, and supplied new locks; painted lantern two coats inside and out; the station is now in good order.

262. *Bogue Banks*.—These light-houses were entirely destroyed by the rebels, and have not been re-established; an estimate of the cost of rebuilding them was last year submitted to Congress, but the item was stricken out of the estimates, from which it is inferred that it is not desired to re-establish them; they will consequently be dropped from the list of lights.

Relief light-vessel, (No. 21.)—This vessel temporarily marked the Willoughby Spit station until the 4th November, 1868, when she was relieved by the vessel belonging to the station, taken into Norfolk and a new lantern-mast set, new cathead provided, new main deck awning, new clock, new foremast and bowsprit stays furnished; waterways forward and aft, two beams forward, bulwarks, and pumps repaired; thirty six pieces defective deck plank replaced by new; rigging refitted, and sides and deck recalcked; all that part of the vessel above water repainted, and new bedding supplied; she was then temporarily placed on the Wolf Trap station, while the vessel belonging there was withdrawn for repairs. She remained on the station from the 8th January, 1869, to the 24th February, when she returned to Norfolk, was supplied with an additional mushroom anchor, ninety fathoms one and three-quarter inch chain cable; and on the 8th March moored on the Windmill Point Shoal station, where she remained until the completion of the iron screw-pile light-house on that shoal, on the 1st September, 1869, when she was immediately transferred to the York Spit station, where she now is, and will remain until the requisite repairs are made to the vessel properly belonging to the station, when she will be relieved.

Relief light-vessel, (No. 25.)—This vessel was taken up on the railway, the yellow metal sheathing repaired; also, decks, plank-sheer, and bends; the rigging refitted, the deck and sides recalcked; the vessel

repainted, and new running rigging supplied. She is now in good condition for service.

Light-vessel, (No. 28.)—This vessel was taken up on the railway; her sheathing cleaned; decks and sides re-calked; all defective planks in decks and sides replaced by sound ones; rudder repaired; a new bowsprit provided; a cooking-stove and new bedding supplied; and the vessel properly painted. This vessel is now in good condition, and has on board one year's supply of oil, and everything requisite to keeping a light. It is intended to send her to Galveston, to occupy the light-vessel station there, and she only waits a favorable opportunity to go there.

BUOYS.

The buoys in Metomkin, Watchopreague, Hog Island, Matchapungo, and Sand Shoals Inlets have received proper attention.

Eastern Coast of Virginia.—On the 22d September, 1869, a second-class iron can-buoy, painted with red and black horizontal stripes, was placed to mark the wreck of the ship Ann Eliza, sunk in three fathoms water, about a mile to the eastward of Smith's Island, Virginia.

Cape Henry Channel, Hampton Roads, and Norfolk Channel.—These buoys require some attention, which will be given them by the buoy tender. The second-class iron nun-buoy off Sewall's Point has twice disappeared and been replaced. The Portsmouth spit-buoy was struck by the wheel of an unknown steamer, and was afterward taken up in a sinking condition, a sound buoy of similar character being put in its place. The buoy at Upper Shoalwater disappeared, and a second-class iron can-buoy was put in its place.

Hampton Creek.—The buoys are in order.

Elizabeth River, southern branch.—These buoys are in good order. Oyster Rock buoy, No. 8, has received particular attention.

James River.—The buoyage in this river has been regularly attended to. A second-class iron can, painted black, has been placed in sixteen feet water to mark a wreck between City Point and Richmond.

York River, Mobjack Bay, and Piankatank.—It is expected that all the aids to navigation in these localities will be replaced in good order by the 20th October, 1869.

Rappahannock River.—These buoys are now being overhauled, and will be in good order by the 31st October, 1869.

Great Wycomico.—After the buoys in the Rappahannock River have been attended to, those in this river will be overhauled by the same working party and put in good order.

Potomac River.—The buoys in this river have been regularly attended to. An additional buoy has been placed on Heron Island bar to mark the entrance to St. Clement's and Burton's Bays.

Chesapeake Bay, from the Capes of Virginia to Havre de Grace, Maryland.—These buoys have been attended to. During the year first-class iron can-buoys have been placed to mark the positions formerly occupied by the light-vessels at Smith's Point and Windmill Point; and the spars off Sandy Point and Thomas's Point have been replaced by second-class iron can-buoys.

West River, Annapolis Roads, and Bodkin Swash buoys are in good order.

Patapsco River and Brewerton Channel are marked by buoys in good condition.

North Point Creek and Swan Point Channel.—The buoys are in good

condition and properly attended to, as well as the buoys in the new channel from Fishing Battery to Havre de Grace.

Cherrystone Inlet, Naudua, Pungoteague, Matchalaak, Onancock, Chesennessic and Hunting Creeks.—The buoys in these waters were overhauled in August, 1869, and the buoyage is now in good condition.

Hunger's Creek.—A second-class iron nun-buoy and a spar-buoy were placed at the entrance to, and a spar-buoy in, this creek in December, 1868. They were overhauled in August last, and are in good order.

Occohannock Creek.—The buoys in this creek were overhauled in August last. The spar that marked the entrance to the north channel has been replaced by a second-class iron can-buoy, and an additional spar-buoy moored in the same channel. Three new buoys, a second-class iron nun, and two spars, have been placed to mark the south channel.

Hooper's Straits, Kedge's Straits, Tangier Sound, and Little Annamesic River.—The buoys were replaced in August last, and the buoyage is now in good order.

Wicomico River.—These buoys were replaced in September, 1869.

Pocomoke Sound, Great Choptank River, Eastern Bay, St. Michael's River, Wye River, Chester River, and Little Choptank River were visited in August, 1869, and the buoyage put in complete order.

Hatteras Inlet and Ocracoke Inlet.—The buoys in these inlets were visited in February, 1869, and put in complete order. They now require attention again.

The buoys in *Neuse River Inlet* were replaced in March last.

Pamlico Sound and River.—The buoyage was put in complete order in March last, but again requires attention.

Hyde County Landings and Bell's Bay buoys were put in good order in March last.

Pamlico Sound.—The buoys were put in order in March. The day beacon near Croatan Marshes—a stake with barrel on top—has been replaced by a spar-buoy.

The buoys and stakes marking the entrance into and through *Croatan Sound* to *Albemarle Sound*, and in the tributaries of *Albemarle Sound*, viz., *Pasquotank, Alligator, Little Perquimons, Scuppernong, and North Rivers*, were replaced in March, 1869.

North Landing River.—The beacons in this river were attended to in February, 1869. The beacon reported in last annual report as having disappeared has been replaced.

Core Sound.—The buoys were overhauled in February, 1869, and replaced in their proper positions.

TENDERS.

The *Heliotrope* (steamer) has been employed in the usual work of replacing buoys and carrying supplies to the light-houses in the district. She has been extensively repaired in hull and machinery.

During the time that the *Heliotrope* was under repair the tender *J. N. Seymour* (now the *Tulip*) performed the duties of the former, and was afterward employed as the tender upon such works of construction and repair as were under charge of the engineer of the district. Although small, she answers the purpose, and is in good order.

The schooner *William F. Martin* was chartered to assist in the buoy service. Whenever not actually employed she was discharged, and when again required was re-chartered. She is now under charter, but will be discharged about the close of November.

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SIXTH DISTRICT.

In the sixth district, extending from New River Inlet, North Carolina, to include Cape Canaveral light-house, Florida, there are—

Light-houses and lighted beacons	25
Light-houses and lighted beacons formerly exhibited but not now lighted, structures standing	9
Light-houses and lighted beacons formerly exhibited, structures not standing...	14
Buoys in position	147
Spare buoys to supply losses	43
Beacons unlighted	8
Light-vessels	6
Tenders, (steam)	None.
Tenders, (sailing schooners)	3

263. *Federal Point, Cape Fear, N. C.*—This station is in general good condition; the foundation piles have been pointed.

264. *Frying-pan Shoals light-vessel, (No. 29,) outer end of the shoals, North Carolina.*—This vessel was thoroughly repaired in 1868. No repairs have been needed since.

265 and 266. *Oak Island beacons, Cape Fear, N. C.*—Some small repairs have been made at this station; it is in good condition, but will need painting next year.

267. *Georgetown, S. C.*—No repairs have been made at this station; it is in good condition.

268. *Cape Romain, S. C.*—Some small repairs have been made to the kitchen of the assistant keeper's dwelling. An embankment has been made around the tower; the tower cement-washed brick color, and the old tower colored with red and white horizontal bands to serve as a day-mark and to distinguish the station from adjacent ones. In September, 1868, slight cracks were discovered in the tower on the north and south sides, in which the windows are placed. These cracks remain very much as they appeared when first observed.

269. *Bull's Bay, S. C.*—This station is in good condition; no repairs have been made during the year.

270. *Rattlesnake Shoals light-vessel, (No. 30,) temporarily placed off Charleston Bar, S. C.*—This vessel was examined in the month of March last, and found to require extensive repairs. The relief vessel was placed as a substitute, and the vessel No. 30 thoroughly repaired and returned to her station in July.

271. *Weehawken light-vessel, Charleston Harbor.*—Wreck of Weehawken. The decks of this vessel have been sheathed with plank; other small repairs made during the year.

272. *Sullivan's Island, Charleston Harbor.*—This is a temporary structure and in a dilapidated condition. Plans and estimates have been prepared for two suitable lights to serve as a range at this station, and which will probably be built at an early day.

273. *Fort Sumter, Charleston Harbor.*—This structure has been painted and is in good condition.

274. *Castle Pinckney, Charleston Harbor.*—The building has been painted during the year and is in good condition.

275. *Battery Beacon, Charleston, S. C.*—This beacon has been discontinued.

276. *Combahee Bank, St. Helena Sound.*—Repairs have been made to the parapet of the lantern to prevent its leaking. The iron-work of the screw-pile foundation has been painted, and the station is in good condition.

277. *Martin's Industry light-vessel*, (No. 32,) at entrance to Port Royal, S. C.—The sails of this vessel have been repaired and the vessel painted.

278. *Bay Point*.—Light discontinued.

279. *Hilton Head*.—Range lights discontinued.

280. *Braddock's Point, Calibogue Sound*.—There is appropriation for erecting a light-house at this point in place of the light-vessel formerly stationed in Calibogue Sound. This structure will be commenced as soon as the title to the site is perfected.

281. *Fishing Rip light-vessel*.—Station has been discontinued and the light-vessel transferred to Tybee Knoll.

282. *Tybee light-house, entrance to Savannah River, Ga.*—This station is in good condition.

283. *Tybee Beacon, (range light.)*—In consequence of the threatened encroachment of the sea upon the site of this beacon, a breakwater of brushwood was placed in front of it. Finding the site since threatened by the washings at every gale, it was deemed advisable to remove the beacon back one hundred and sixty-five feet from its original position.

284. *Tybee Island Knoll light-vessel*, (No. 33.)—This vessel was removed from Fishing Rip when that station was discontinued.

285. *Cockspur Island Beacon, Savannah River, Ga.*—This beacon is in good condition.

286. *Oyster Beds Beacon, Savannah River, Ga.*—This beacon is in good condition.

287. *Fig Island Beacon, Savannah River, Ga.*—This station is in fair condition. Some small repairs will be needed next year.

288. *The Bay, Savannah, Ga.*—This beacon-light being no longer a range, has been discontinued.

289. *Sapelo, entrance to Doboy Sound, Ga.*—Revolving machinery repaired, and some small repairs to parapet around the lantern.

290. *Sapelo Beacon, for range*.—Some small repairs made to the beacon. The station in general good condition.

291 and 292. *Wolf Island Beacons, Ga.*—These beacons were completed and the lights exhibited October, 1868. The station is in good condition.

293. *St. Simon's, entrance to St. Simon's, Ga.*—This light-house is being built under public contract.

294. *Little Cumberland Island, Ga.*—This station is in fair condition. Some small repairs have been made; and a new roof for the keeper's dwelling will be needed next year.

295. *Amelia Island, Ga.*—This station is in good condition. Some small repairs have been made to the keeper's dwelling, and steps made between the main light and the beacon.

296. *Amelia Island Range Beacon*.—Some small repairs made upon the beacon.

297. *St. John's River, Fla.*—The tower has been pointed and cement-washed. The station is in good condition.

298. *St. Augustine, Fla.*—The site of this light is threatened by the washings of the sea in heavy storms. Steps are in progress for arresting the further washing away of the site.

299. *Cape Canaveral, Fla.*—This structure is of cast iron lined with brick, with iron bands extending through from the outside at every eight feet. The work has been well executed, and the station is in good order and condition.

Relief light-vessel, (No. 34.)—This vessel has been thoroughly repaired during the year, and is kept at Charleston, South Carolina, to be in readiness for service in the district.

Buoys actually in position.—The buoys in the district have been lifted and repaired, moorings examined, and those needing it repaired.

TENDERS.

The sailing schooner *Maggie* of eighty tons has been employed, when not undergoing repairs, in looking after the buoys in position and in delivering supplies to light-vessels. In October, 1868, this vessel was extensively repaired, and in April, 1869, she was docked, copper repaired, and some additional work done upon her. This vessel having been caught in a severe gale in June last, lost the center-board and sprung a leak. The damage to this vessel by the gale was such as to render it necessary to have her towed to Charleston, where she was put in good repair.

The sailing schooner *Dupont* (a very small vessel) has been kept in this district during the past year and performed such duty as her size and tonnage would permit. On the 1st of October, 1869, this vessel, having been repaired, was dispatched to Key West for the use of the engineer in that district.

The sailing schooner *Narragansett* has been fully employed under the direction of the engineer of the district with working parties at Sapelo and Wolf Island light stations, and in visiting light stations where repairs and renovations were required. The *Narragansett* has had a new center-board, well fitted and lined inside with metal to prevent injury from the worms, and some small repairs and outfits; she is now in good condition.

DEPOTS FOR BUOYS, ETC.

The depot of supplies and for keeping spar buoys at Fort Johnson, Charleston Harbor, is the general depot for this district. The wharf having fallen into decay from age, is now being thoroughly repaired.

SEVENTH DISTRICT.

In the seventh district, extending from Cape Canaveral, Florida, to include Cedar Keys, Florida, there are—

Light-houses and light beacons.....	10
Beacons, (unlighted).....	16
Light-vessels.....	None.
Buoys actually in position.....	61
Spare buoys to supply losses.....	44
Tenders, (steam).....	None.
Tenders, (sailing schooner Florida).....	1

305. *Jupiter Inlet, Fla.*—The illuminating apparatus has been overhauled and adjusted. A few small repairs are needed, which will be made before the end of the year. The general condition of the station is good. The isolated position of this light station makes it difficult to visit it very often.

306. *Cape Florida, Key Biscayne, Fla.*—Some small repairs have been made at this station. Its general condition is good. The tower needs to be washed with cement, and some small repairs are required upon the keeper's dwelling, which will be attended to this season.

307. *Carysfort Reef, Florida Reefs.*—This structure (wrought-iron piles) has been thoroughly scraped, cleaned, and painted. The doors and windows have been refitted throughout, new water gutters and conductors fitted and led into the water tanks. The illuminating apparatus and revolving machinery overhauled and repaired.

Alligator Reef, Florida Reefs.—In the original programme for lighting

the coast, to render navigation safe and easy, this point on the Florida Reefs was selected for the site of a first-class sea-coast light. The prominence of the locality on this dangerous coast to the navigator pointed it out as one requiring early and special attention. The rebellion prevented any steps being taken between 1861 and 1865, and since that time, other works of pressing necessity on the southern coast claimed the particular attention of Congress and the board. It would now, however, seem to be a fitting time to invite the especial attention of Congress to the subject, and an estimate will be found submitted in the annual estimates for the establishment of this important light station. Alligator Reef forms a kind of elbow or turning point for vessels passing either way through the Florida Pass. It is about midway between Carysfort Reef and Dry Bank light-houses, sixty-one nautical miles distant the one from the other, leaving between them an unlighted space of upwards of thirty miles for the navigator to grope his way through, and having to contend against strong and irregular currents, which are greatly influenced by the prevailing winds, by the tides, and by the general character and state of the weather. With the establishment of this light on the border of the reefs, navigation around Cape Florida from the Gulf of Mexico will, with the other aids to navigation, be made comparatively easy and safe, with ordinary attention and care.

308. *Dry Bank, Sombrero Key, Florida Reefs.*—This structure (wrought-iron piles) has been thoroughly scraped, cleaned, repaired, and painted, and is now in good order and condition.

309. *Sand Key, off Key West, Fla.*—This structure (wrought-iron piles) has received the necessary attention for keeping it in good order. Some small repairs have been made, and the illuminating and revolving apparatus overhauled and adjusted.

310. *Key West, town of Key West, Fla.*—Some small repairs have been made at this station. The light is well kept, and the station is in good order and condition.

311. *Northwest Passage, Key West Harbor.*—This structure (wrought-iron piles) has been thoroughly repaired and painted, and a number of panes of glass placed in the lantern. This is in good order and condition.

312. *Dry Tortugas, (Loggerhead Key,) Fla.*—The necessarily rigid quarantine kept up at Fort Jefferson, Dry Tortugas, has prevented the needed repairs upon the tower at that station from being made during the past summer. The tower requires to be repointed, and painted with alternate white and black bands from the base to the lantern, to render it a better day-mark. These repairs will be made during the autumn. The illuminating apparatus is in good order and condition.

313. *Dry Tortugas Harbor, Fort Jefferson.*—The general condition of this light is good. Some small repairs are needed, which will be made as soon as the season is sufficiently advanced to resume work in that quarter.

314. *Egmont, Egmont Key, Fla.*—This station is in good order and condition. Some small repairs may be required to be made during the present season.

DAY OR UNLIGHTED BEACONS.

Of the sixteen day beacons or marks which were erected prior to 1861 on the outer edge of prominent points on the Florida Reefs, but six remain to aid the navigator. Congress at its last session made an appropriation upon the recommendation of the board for restoring such of those beacons

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as had been injured or destroyed. Ten of them are now in course of construction by contract, and it is expected that they will be placed in their respective positions and the entire reef properly beacons during the present autumn and early part of the ensuing year.

BUOYS IN POSITION.

The buoys placed to mark the Hawk Channel, (between the outer reefs and the land,) those marking the three channels or entrances to Key West Harbor, and those in the harbor at Dry Tortugas, have been carefully looked after and kept in their proper positions. Spare buoys to supply losses and to take the places of those requiring to be repaired and repainted, have been kept in readiness for immediate use.

TENDERS.

The only tender in this district is the sailing schooner Florida. That vessel has been constantly in attendance upon the lights and buoys, in delivering supplies, and in visits of inspection.

EIGHTH DISTRICT.

The eighth district extends from Cedar Keys, Florida, to the Rio Grande, Texas. In this district there are—

Light-houses and lighted beacons	40
Light-houses and beacons unlighted	18
Day beacons	8
Buoys actually in position	75
Spare buoys to supply losses	113
Tenders, (steam)	1
Tenders, (sailing schooner)	1

315. *Cedar Keys, Florida.*—The condition is good; no repairs made during the year, and none are needed at this time.

316. *St. Mark's, Florida.*—The condition is good.

317. *Dog Island, Florida.*—The condition of this station is good.

318. *Cape St. George, Florida.*—Some small articles furnished; no repairs needed; condition good.

319. *Cape San Blas.*—The beach in front of this light station is washing away, and will need protection against the encroachments of the sea during heavy storms. A dwelling for the keeper will be required to be built at this station, for which an estimate is submitted.

320. *Pensacola, Florida, main light.*—The temporary fourth-order light at this station was replaced on the first of April last by a first-order revolving light. A new dwelling has been built for the keepers, and the necessary repairs to the tower made during the year. The station is now in good condition.

Beacon range-light.—This beacon, which is placed in front of the main light to serve as a channel range, is in good condition.

321. *Sand Island, entrance to Mobile Bay.*—The temporary light at this station is in tolerable condition. A new tower and other necessary buildings have been commenced to supply the place of those destroyed during the rebellion.

322. *Mobile Point, entrance to Mobile Bay, Alabama.*—The temporary light at this station is in as good condition as the character of the structure will justify.

323. *Choctaw Point, Mobile Bay.*—This station will be re-established on Battery Gladden Island.

324. *Round Island, off Pascagoula, Mississippi Sound.*—This station is in good condition.

325. *East Pascagoula.*—This station is in good condition.

326. *Ship Island, Mississippi.*—This station is in good condition; a cooking-stove has been furnished.

327. *Biloxi, Mississippi.*—The condition of this station is good. A cistern is recommended for this station to afford means of a certain supply of wholesome drinking and potable water. Some protection to the site against the effects of southern gales may become necessary during the next year.

328. *Cat Island, Mississippi Sound.*—This station will be rebuilt at the earliest practicable day.

329. *Pass Christian, Mississippi.*—This station in good order.

330. *Merrill's Shell Bank, Mississippi Sound.*—A fog-bell has been furnished during the year. A cooking-stove and rope for boat-hoisting tackles supplied.

331. *St. Joseph's Island, Mississippi.*—The condition of this light is good, but the outhouses and wharf were destroyed by the last September gale. The necessary repairs will be made without avoidable delay.

332. *Rigolets, Pleasonton's Island, Pearl River, Lake Pontchartrain.*—This station is in good condition, with the exception of some slight damage done to the wharf and plank walk by the late September gales. These repairs will be made at the first favorable moment.

333. *Proctorsville beacon-light, Lake Borgne.*—It is proposed to reconstruct this station at a cost of about \$5,000. The position is an exposed one to high stages of water in storms and hurricanes.

334. *West Rigolet, eastern entrance to Lake Pontchartrain.*—This station was in fair condition until the late gales of September 5 and 7, when it sustained some damage. A breakwater extending along the bank of the Bayou Rigolet, in front of the house, to a distance of about 300 feet, was washed away in several places, and the wharf and plank walk were almost entirely destroyed. The cistern has settled down and now leans against the west side of the house. The old shingle roof, in consequence of the vibration of the structure during the storms, was made leaky. It is proposed to repair this station at an expense of about \$5,000.

335. *Bon Fouca, entrance to Bayou Bon Fouca.*—An appropriation of \$8,000 is available for rebuilding this light at *Pointe aux Herbes* as a preferable position to that of the old one. It is necessary to obtain title to the proper site before the structure can be commenced.

336. *Port Pontchartrain, Louisiana.*—During the gale of September 5 and 7 this station received much damage. The rear platform and kitchen were entirely carried away, the cistern capsized, the plank walk leading from the dwelling to the railroad wharf entirely destroyed. The dwelling rests upon piles which are very rotten, and another heavy gale might destroy the entire dwelling and its inmates. No damage was done to the tower and its concrete base, except the breaking of some window glass.

337. *Bayou St. John's, Louisiana.*—The repairs to this old screw-pile foundation, and additions to fit it for the accommodation of a beacon-light, were completed last March. This structure sustained no injury by the late gale. The wharf upon which the temporary light has been kept for some time was seriously damaged.

338. *New Canal, Louisiana.*—This station has been thoroughly repaired during the year. A substantial breakwater has been built on the east side of the structure, a slate roof substituted for the old one of

shingles, which endangered the building from the sparks of passing steamers and the stove-pipe.

339. *Tchefuncti River, near Madisonville, Louisiana.*—In good condition and order.

340. *Pass Manchac, between Lakes Maurepas and Pontchartrain, Louisiana.*—In good condition and order.

341. *Chandeleur Island, Louisiana.*—The tower is in good condition. The dwelling, built on five screw-piles, needs some small repairs, which will be made at an early day.

342. *Pass à l'outre, mouth of the Mississippi River, Louisiana.*—This station is in excellent condition. The breakwater around the dwelling, platform in the rear of the house, and extension of the shed roof over the galleries, were completed last February.

343. *South Pass, mouth of the Mississippi River, Louisiana.*—The recommendation made in the last annual report to substitute an iron tower of the first class for the present wooden structure, which might at any time be destroyed by fire, leaving this most important point without a light, is again submitted for the consideration of Congress, and an estimate submitted in the annual estimates. The progress of the work at the Southwest Pass of the Mississippi, a locality very similar as regards geological features to those of the South Pass, would enable the board to transfer, at small cost, the tools and implements in use there at an early date, and to save much of the expense incident to the building of a foundation which would probably, in many respects, be similar, if not identical with, the one now in process of construction at the Southwest Pass. The advantages of following up the work at Southwest Pass by that of the South Pass would insure a saving of at least \$20,000 and probably more. The present wooden structure is in fair order, some small repairs having been made during the year.

344. *Head of the Passes, Mississippi River, Louisiana.*—This station is in excellent condition. Repairs upon the light-house and kitchen were completed in March last. The space inclosed by the breakwater is rapidly filling up with solid earth, upon which a number of young willow trees and other plants are growing, which will still further tend to consolidate the soil.

345. *Southwest Pass, Mississippi River.*—The old light-house at this station sustained considerable damage during the late September gales. The work now in front of the tower was entirely destroyed, one of the cisterns was carried away into the marsh, and doors and windows of the dwelling stove in. A new door to the tower was made and sent to the station. Temporary repairs, sufficient for the continued exhibition of the light, were promptly made by the light-keeper. The site for the new light-house tower authorized for this station was carefully examined and surveyed, in July and August last, and preparations made for the commencement and prosecution of the work. It is expected that the progress of the new work will be such as to obviate the necessity for any except very slight repairs to the old tower.

346. *Barrataria Bay, Louisiana.*—This station is in good condition.

347. *Timbalier Bay, Louisiana.*—There is an appropriation for rebuilding the light-house (destroyed by a tornado) at this place. The work will be commenced at the earliest practicable day.

348. *Ship Shoal iron screw-pile tower, &c., off Racoon Point, Louisiana.*—This station is in good condition. The work for preserving the foundation of this important light-house was finished in July last.

349. *Southwest Reef, entrance to Atchafalaya Bay, Louisiana.*—This

station is in good condition. The structure was thoroughly repaired in 1868.

350. *Shell Keys, Louisiana*.—This structure, which was completely destroyed by the tornado of October, 1867, will be rebuilt, at the earliest practicable day, out of the appropriation already made.

351. *Sabine Pass, Brant Point, entrance to the Sabine River, Texas*.—This station is in good condition,

352. *Bolivar Point, entrance to Galveston Bay, Texas*.—The present light at this point is merely a temporary one. An appropriation is asked, and an estimate submitted. The destruction of the original iron tower at this point made it necessary, at the close of the rebellion, to establish a temporary light, to assist vessels bound to this port, until an adequate appropriation could be obtained from Congress for the erection of a suitable structure. A light-vessel is now ready to be sent to be moored inside the outer bar, to guide vessels into the bay.

Bolivar Point Beacon.—This beacon cannot be re-established before the new light is built, but the light-vessel, to be placed inside the bar, will serve as a substitute until the entire station is restored.

353. *Pelican Spit Beacon, Galveston Bay*.—This station was also destroyed during the war. It will not be of any great use until the lights are re-established at Bolivar Point.

354. *Galveston Range Beacons*.—The re-establishment of these lights will depend upon the developments of new surveys, and after the outer and more important lights are rebuilt.

355. *Half Moon Shoal, Galveston Bay, Texas*.—This station was thoroughly repaired, and the light would have been exhibited in the month of September but for the fact that a steamer ran into it and damaged it seriously. The owners of the steamer have agreed to make good the damage, and the light will be exhibited at an early day.

356. *Red Fish Bar, Galveston Bay*.—This station has been thoroughly repaired, and is now in good condition.

357. *Clopper's Bar, Galveston Bay*.—This station has been thoroughly repaired this year, and is now in good condition.

358. *Matagorda, Texas*.—This station suffered very much by the hurricane of August 16 last. The structure at this station is a temporary wooden tower. As soon as the title to the site is approved, and the jurisdiction ceded by the State, the new buildings will be constructed.

359. *Saluria, Texas*.—This station which was entirely destroyed during the war, has not been re-established. Although useful for interior navigation, its reconstruction is not so necessary as many other lights on that coast.

360. *Half Moon Reef, Matagorda Bay, Texas*.—This station is in good condition with the exception of some small repairs, which will be made.

361. *Swash, Matagorda Bay, Texas*.—There is an available appropriation for the re-establishment of this light, but as it is an interior navigation light, the necessity for its being relighted is not so great as to justify the neglect of other works at this time.

362. *Aransas Pass, Texas*.—The general condition is good. During heavy gales the tower leaks. The necessary repairs will be made. This is a very exposed position, and, during the hurricane of last August, the island upon which the light is built was covered with from two to three feet water, which carried away one of the out-houses and some lumber.

363. *Brazos Island Beacon, Texas*.—The condition of this station is good. The position is an exposed one, especially during northeast gales.

364. *Point Isabel, Texas.*—This station is in good condition; no repairs required during the year.

UNLIGHTED BEACONS.

Pass à l'outre.—This beacon is still in a serviceable condition, but will require rebuilding in a year or two.

Atchafalaya Bay.—The five beacons, of wrought-iron tubes on cast-iron piles, for Atchafalaya Bay, are constructed, and will be put in their respective positions so soon as the necessary suitable transportation can be had.

Galveston, Texas.—The iron beacon, near the entrance to the channel, over the bar, is in good condition.

SPARE BUOYS FOR RELIEFS AND TO SUPPLY LOSSES.

The spare buoys and their appurtenances number 113, and are kept in readiness for use at New Orleans; Head of the Passes, Galveston, Texas; Fort Morgan, Alabama; Fort Pickens and Cedar Keys, Florida.

TENDERS.

The steam tender *Geranium* was employed, up to the last of May, 1869, in keeping the buoys in position, delivering supplies and materials at the different light stations, and in making inspections. This vessel is undergoing extensive repairs, which will be completed within a few weeks. The small sailing schooner *Florida* has been employed in the survey of Ship Shoal, and at that station during the progress of the repairs. This vessel, having been run into by a steamer, the owners of the steamer made the necessary repairs at their own expense. Since last July this vessel has been employed at the Southwest Pass. Three launches have been in constant use in the district during the past summer.

BUOY DEPOTS.

The depot at the Head of the Passes of the Mississippi has been improved during the year. During the month of May the wharf and that portion of the railroad upon it were greatly damaged by the caving in of the river bank above and at the wharf. To prevent loss from a like cause hereafter, it is proposed to construct a floating wharf, at small expense.

It is proposed to erect a buoy shed, at small cost, near Fort Pickens, Florida, one at Fort Morgan, Mobile Bay, and one at Sabine Pass, Louisiana.

TENTH DISTRICT.

Extends from the mouth of the St. Reigs River to include the Grassy Island light-house, Detroit River. There are in this district—

Light-houses and lighted beacons	46
Light vessels	None.
Beacons, (unlighted)	None.
Buoys actually in position	110
Tenders, steam, (for tenth and eleventh districts in common)	1
Tenders, (sailing)	None.

The steam tender *Haze* is used in common by the inspectors of the tenth and eleventh districts, and is also used by the engineers of these districts after the light stations have been inspected and supplied.

LIGHT STATIONS.

The numbering of stations is according to the light-house list for the lakes of January 1, 1869.

11. *Ogdensburg*.—The keeper's dwelling and tower have been sufficiently repaired to make them habitable only for the winter, as they are not worth general repair. The barn has been reduced in size and turned into a boat-house. A new dwelling for the keeper, with tower attached, of brick of the same plan as that at Stony Point, is recommended. The cost of this is estimated at \$12,000, if it can be built without using piles for the foundation; but, with piles, it will probably cost \$13,000.

12. *Cross-over Island*.—This station has been put in good condition. Boat-house and ways have been built, woodshed repaired, shutters put on the windows, plastering renewed in both house and tower, and chimney-tops renewed. The isolated position of this station has made these repairs more than usually expensive.

13. *Sunken Rock*.—This station is in good condition. No repairs have been made here during the last year, and none will be needed, probably, during the next.

14. *Rock Island*.—In good condition. No repairs made during this last season. None recommended for the next.

Sister Islands.—The title to the islands has, at last, been perfected after nine years of persistent labor. The deed has been recorded in Jefferson County (N. Y.) court, and the purchase money (142 33) paid to Charles and John F. Walton. The jurisdiction over these islands was ceded to the United States by act approved April 18, 1861. An appropriation for building a light station on this site was made in the act of March 2, 1867, of \$10,000. Plans for the structure which will be of brick, are now being prepared in this office. It is proposed to collect all the necessary material for the work during the winter, and to commence the building in the early spring.

15. *Tibbett's Point*.—All repairs necessary to this station have been completed. The dwelling and covered way have been shingled, floors repaired, new windows and sash put in, cistern and barn repaired, and the tower covered with cement and ventilated.

16. *Galloo Island*.—The dwelling and tower are in excellent condition; but it is proposed to reshingle the barn and to build a boat-house and ways.

17. *Horse Island*.—A new boat-house has been built here. General repairs have been made in the tower, dwelling, and barn, to make them useful for the winter only. They are in such dilapidated condition that further repairs cannot be made. It is recommended that a new dwelling, with tower attached, similar to those at Stony Point, be erected in their place as soon as practicable, at an estimated cost of \$12,000.

18. *Stony Point*.—Authority was given for the erection of a new dwelling, with tower attached, similar to that at Copper Harbor, in June last, and the work was at once commenced, and has been carried on vigorously, and will be pushed to completion before the close of the season. The stone used has been quarried near the site. All the materials for construction are on the ground, and the new lantern and glass have been received. This work will cost about \$13,000, in consequence of the difficulty of access to the place and the high price of labor.

19. *Oswego*.—The work of raising the tower fourteen feet, putting on a new lantern, building an inner brick wall and watch-room for the keeper, is nearly completed, when a third-order revolving light will be substituted for the present fourth-order fixed light. The dwelling is

being reshingled, plastered, and painted, and the well and drain are undergoing repair. Davits will be erected on the pier for the safe-keeping of the boat. When these works are completed the premises will be in good condition.

20. *Big Sodus Beacons*.—These ranges, which are small lights suspended from masts, are in good condition.

21. *Big Sodus Bay*.—The dwelling and tower have been slightly repaired, sufficiently to make them serviceable during the winter. They are not worth general repair. A new dwelling, with tower attached, at an estimated cost of \$14,000, is recommended.

22. *Genesee Beacon*.—This station is in good condition, but it is proposed to make some slight repairs upon its fences.

23. *Fort Niagara*.—Four new ventilators have been put into the lantern. The keeper's dwelling has been refloored in part; a woodshed, a privy, and a barn have been built; the dwelling has been reshingled, and shutters and gutters attached. The house and grounds are now in perfect order and repair. The light is exhibited from a lantern erected on the officer's quarters in the fort. The importance of this station, as a coast and harbor light, seems to require the erection of a more suitable and more permanent structure at an early day.

24. *Black Rock Beacon*.—No repairs were found necessary during last season, and none are now necessary. This light was intended to guide vessels to Black Rock Harbor while the Horseshoe Reef light was in course of erection. That being completed, this is no longer necessary, and should, accordingly, be discontinued.

25. *Horseshoe Reef*.—The pier of protection has been iron-plated to prevent injury from the ice, and it is now in good condition, with the exception of one corner, which will be strengthened at an early day. It is proposed to make general repairs in the wood-work of the house and tower during the coming season.

26. *Buffalo*.—The dwelling has been reshingled; a drain has been made, and the premises have been inclosed within a board fence. It is proposed to strengthen the tower at the base to prevent further vibration when the pier is struck by waves, and possibly to strengthen the wharf near the storehouse.

27 and 28. *Dunkirk and Beacon*.—The tower has been pointed and whitewashed outside, and thoroughly repaired inside. The dwelling has been refloored, reshingled, replastered, and painted; new windows have been cut to increase the ventilation; sash and blinds have been renewed, new covered way to the tower made, new privy and substantial fence put up; the cellar has been supplied with enlarged windows to increase the ventilation. The exterior of the beacon has been resheathed, painted, and sanded; its foundation strengthened, new stairs and ceiling supplied, decking and glass frames repaired, and lantern door refitted. The station is now in perfect repair.

29. *Presque Isle, (Erie)*.—The brick dwelling has been reshingled and replastered; the interior has been thoroughly repaired. A cornice has been put up and the guttering renewed, and a new woodshed been built. The station is now in good condition.

30. *Presque Isle Beacon*.—The dwelling has been painted and generally repaired. The beacon has been repainted and a new woodshed has been built. It is proposed to protect the beach near the dwelling by a filling of stones.

31 and 32. *Beacon ranges Nos. 1 and 2*.—New masts have been erected for the range lights, and covers made for the lanterns to protect them from the weather, provided with locked doors to prevent interference

with the lenses, and a plank footway for the keeper provided. The ventilation of the lanterns has been secured, and the lights are now well sheltered from all interfering causes, and give entire satisfaction.

33. *Conneaut Beacon*.—The beacon has been repainted and sanded, and the glass puttied. The premises are now in good condition; but no keeper's dwelling is attached.

34. *Ashtabula Beacon*.—The premises are in good condition. No repairs are needed. It is also without a dwelling for the keeper.

35. *Grand River*.—Temporary repairs have been made to render the dwelling and tower serviceable for the winter. But they are in such a dilapidated condition that it is proposed to use the appropriation made March 31, 1869, of \$30,000, in erecting a tower similar to that at Erie. The details of the work will be gotten out during the winter, and the stone and other work contracted for, so as to commence building early in the spring.

36. *Grand River Beacon*.—The beacon is in good condition.

37. *Cleveland*.—Temporary repairs have been made to the dilapidated dwelling and outhouses to make them available for the winter; but it is proposed to use the appropriation of \$45,000 made in March, 1869, in erecting new structures as soon as a proper site is selected, which will be at an early day.

38. *Cleveland Beacon*.—The crib has been refilled with stone and planked over with oak, and the tower painted and sanded. The beacon is in good condition.

39. *Black River*.—The crib has been refilled with stone and protected with oak timber from drift ice. An elevated walk to enable the keeper to reach the light in bad weather is nearly completed. The dwelling and tower are of inferior brick, and are somewhat cracked at the base.

40. *Vermillion Beacon*.—The wooden tower, the only structure on this station, is in good condition. There is no dwelling for the keeper at this station.

41. *Huron Beacon*.—It is proposed to remove a part of the elevated walk leading to the beacon, and to repair the iron interior stairs in the skeleton iron tower, and to renew a part of the foundation stone. There is no keeper's dwelling here, and as there is no storehouse, the stores are kept in a barn.

42. *Cedar Point Beacon*.—A new woodshed has been built. The premises are now in good condition.

43. *Cedar Point ranges*.—This station has received a pump and fixtures, and is now in good condition.

44. *Sandusky*.—This station is in good condition. A boat-house will be built this season.

45. *Port Clinton*.—It is proposed to inclose the premises within a new fence, to make a cistern, and repair the cellar, when the station will be in good order.

46. *Green Island*.—The dwelling has been replastered, and the premises are now in excellent condition.

47. *West Sister Island*.—A new boat-house has been built, and some slight repairs made on the dwelling. The premises are now in good condition.

48. *Turtle Island*.—A cistern has been built, the cellar repaired, and some slight repairs made to the house. The premises are now in good order.

49. *Maumee Outer range*.—A plank walk has been made connecting the two lights. Nothing further is needed at present.

50. *Maumee Middle range*.—A partition has been built in the dwelling. It is proposed to fence in the site. Premises in good condition.

51. *Maumee Inner range*.—A few repairs have been made in the dwelling, and the cellar drained. When the premises are inclosed they will be in good condition.

52. *Monroe*.—The wooden tower has been supplied with a new lantern and deck, and has been repainted. A covered wooden passageway has been made between the tower and dwelling. The dwelling has been repaired, and the planking of the pier on which the buildings stand renewed.

53. *Gibraltar*.—The dwelling and tower are in a very bad condition and not worth repair. Should the light be continued, a new dwelling and tower will become necessary.

Mamajuda.—A new boat-house has been built. The premises are now in good condition.

55. *Grassy Island*.—The dwelling has been replastered and reshungled; both house and tower have been painted inside and out. A new lantern and deck have been placed on the tower, and the pile pier upon which the building stands has also been repaired.

UNLIGHTED BEACONS.

There are no unlighted beacons in this district.

BUOYS ACTUALLY IN POSITION.

St. Lawrence River is marked by one balloon buoy and seven spar buoys.

Charity Shoal is marked by one iron can-buoy.

Galloo Island Shoal is marked by one iron can-buoy.

Niagara River is marked by seven iron can-buoys and two wooden can-buoys.

Niagara Reef is marked by one iron can-buoy.

Raisin Point is marked by one spar buoy.

Point Monielle is marked by one spar buoy.

Sandusky Bay is marked by one iron can-buoy and ten spar buoys.

Port Clinton is marked by nine spar buoys.

Maumee Bay is marked by three iron can-buoys and thirteen spar buoys.

Detroit River is marked by eight spar buoys.

There has been no change in the buoyage of this district since the last annual report.

Owing to bad weather and the great distance between the stations, some delay was experienced this spring in placing buoys at Sandusky, Port Clinton, Maumee Bay, and Detroit River, as they were fifty in number, and all in charge of one contractor. To prevent delay in future, it is proposed to let the buoy contracts for those stations to three different persons instead of one person, as heretofore, so that each contractor can place his buoys immediately on the opening of navigation, when the service will be better and more punctually performed and at less cost.

Care has been taken to supply the district with a sufficient number of spar buoys for reliefs to those in position, and to replace such as may be found unfit for further use when taken up.

ELEVENTH DISTRICT.

The eleventh district embraces all aids to navigation above Grassy Island light-house, Detroit River. There are in the district—

Light-houses and lighted beacons	70
Light-vessels	None.
Beacons, (unlighted)	1
Buoys actually in position	106
Spare buoys to supply losses	44
Tenders, steam, (common to tenth and eleventh districts)	1
Tenders, (sailing upon Waugoshance works)	1

The operations in the district during the past year, and those proposed for the next fiscal year, are as follows:

56. *Windmill Point*.—General condition good, but requires new kitchen floor, and a fence around the premises on the land side.

57 and 58. *St. Clair Flats and beacon*.—Crib-work wants some repairing; both towers are slightly cracked, and the plastering of the dwelling is off in several places; but these repairs are not deemed important at present, in view of the erection of the range lights at either end of the new cut now in progress. Plans and estimates for these two light-houses have been approved and construction authorized by the board, and the foundation piling will be driven before the close of navigation. It is expected that the light-houses will be ready for occupancy by the time the channel can be opened for navigation.

59. *Fort Gratiot*.—The lantern at this station has a slight leak at its base. The tower is in good condition, except that it needs whitewashing, as does the dwelling on its outside; the latter requires a new dining-room floor and a general painting inside. The wooden addition to the dwelling should be painted outside, and the premises require fencing for protection against intruders.

An additional coast light between Fort Gratiot and Point aux Barques, Lake Huron, and recommended in last year's report, is very much needed. The distance between the two places is seventy-five miles, for the whole of which vessels keep the shore well aboard while going in either direction. An estimate of the probable cost of such a structure as is required is submitted.

60. *Point aux Barques*.—All the light-house property at this point is in good condition. Instructions from the board concerning the trees which obscure the light to the southward and southeastward will be carried out as soon as practicable.

61. *Ottawa (Tawas) Point*.—The walls of the tower here are of solid rubble-masonry, and the pointing and plastering having fallen off the outside, the interior is rendered very damp. The lantern is old-fashioned and leaky, and the storms frequently beat in at its door. The dwelling needs a new kitchen floor, and a cistern is required, together with plank walks on the outside. General repairs will be attended to before navigation closes.

62. *Charity Island*.—The kitchen still needs a new floor, and the walls require plastering in several places; the dwelling also needs painting. The tower and lantern are in good condition.

63. *Saginaw Bay*.—Nothing in the way of repairs seems to be needed at this station at present, further than the renewel of the kitchen floor of keeper's dwelling. As an important aid to navigation at this point, it is recommended that range lights be built to show the way into the river, as the present light only shows its whereabouts; in conjunction with this it would be proper to make the main light of sufficient power

to be seen at a considerable distance, and give it a character readily to be distinguished. To render the new channel available at night for the large commerce which passes through it, two plans for establishing the range lights are suggested: 1st. To erect a tower of about twenty-five feet in height on the prolongation inward of the axis of the channel, and behind this, at a distance of about one thousand feet, a higher tower transferring to it the main light now in use. The cost of this plan is estimated at not less than \$60,000. 2d. To leave the present tower stand to mark the approach to the river, and mark the channel with ranges similar to those at Grand Island Harbor, Portage River, and Copper Harbor. This plan would cost about \$12,000.

Sturgeon Point.—In accordance with plans approved 6th July last, the work at this station has been pushed forward; the dwelling is covered in, and the tower is ready to receive the lantern. It is expected that the light will be exhibited on or about November 1, 1869. The lantern formerly used at Oswego, New York, will be used here.

Trowbridge Point, (Alpena.)—The harbor piers at Alpena having been completed, immediate steps will be taken for the location and erection of a light-house, for which an appropriation was approved July 20, 1868.

64. *Thunder Bay Island.*—Everything at this station is in very good condition, except that the floor of the covered way is often covered with water, which should be remedied as soon as practicable by cementing or elevating the floor.

Presque Isle ranges.—An appropriation of \$7,500 is available for these lights to guide into Presque Isle Harbor. Plans have been prepared for their construction, and the work now only waits for the Attorney General's approval of the title to the site.

65. *Presque Isle.*—The removal of this light to a site north of its present position having been determined upon, the erection of a new tower will require about \$28,000 and an appropriation to that amount is asked for. The \$7,500 appropriated March 2, 1867, for the keeper's dwelling, is still unexpended, its construction having been deferred until measures concerning the tower can be fully arranged; and in view of these requirements no repairs have been made at this point, although the property is in a dilapidated condition.

Spectacle Reef.—A careful survey of the locality was made in July last, and plans for a light-house have been prepared. The cost of a suitable structure here is estimated at \$316,093 20. The peril incurred by navigators, and the difficulties which will oppose the erection of a light at this point, were partially pointed out in the report of last year, based upon which an appropriation of \$100,000 was made by Congress, with which to begin the work, and with which operations will be commenced. It is desirable that the fund be now increased by an additional appropriation of \$100,000, an estimate for which is submitted.

66. *Bois Blanc.*—The tower, lantern and dwelling at this station are new and in excellent condition, except that in the tower the plastering has started from the wall in several places, owing to dampness.

67. *Cheboygan.*—The paving around the light house, suggested in last annual report, has been executed, the remains of the old buildings supplying the material used. The tower, lantern, and dwelling, are in good condition, except the roof of the dwelling, which contains a slight leak. A lightning conductor for the dwelling and a cistern should be provided; the latter will serve as a precaution against fire as well as for domestic purposes, the distance to the lake being a great inconvenience.

Straits of Mackinac.—The necessity of a light to mark the passage between the island of Mackinac and Round Island, known as the North

Channel, is again presented for consideration, and attention is respectfully invited to the remarks upon this head in the annual report of 1867. The estimated cost of a light at this place is \$12,000, for which an appropriation is now asked.

68. *McGulpin's Point*.—The light was first exhibited at this new station June 18, 1869. An unexpected close of navigation shortened the working season, and prevented an earlier display of the light. The total cost of the structure, including the price of the land, was \$19,782 74; the amount appropriated, \$20,000.

69. *Detour*.—The dwelling at this station needs repainting, and a leak in the covered way requires attention; the light-house, which is of iron, should undergo scraping and repainting, having been painted but once since its erection in 1861.

St. Helena Island.—A light to mark the anchorage at this Island is deemed necessary, and an appropriation of \$14,000 is asked for its establishment.

70. *Waugoshance*.—The work upon the new stone pier of protection at this station has advanced steadily and satisfactorily since the opening of the season. Its condition in August last was such as to render unnecessary the further expensive employment of the superintending engineer, and on the 21st of that month he was discharged and the entire work turned over to the engineer of the district. All the stone have been delivered upon the pier, and the top course, it is expected, will be laid and finished by the 15th October, (instant.) Plans of the keeper's dwelling have been prepared, but it is not deemed prudent to commence its construction at this time, the season being too near its close for any extended operations. The light has been exhibited as usual during the progress of the new work. The estimated cost of the dwelling is \$12,000.

71. *Skullagalee (Ile aux Galets)*.—The tower, lantern, and dwelling are new and in good condition. A new boat is required.

72. *Beaver Island Harbor*.—The repairs at this station will be made next season, until which time the tower, although presenting a bad appearance, is considered safe. The appropriation of \$5,000, approved July 20, 1868, is still available.

73. *Beaver Island*.—The tower and dwelling are in good repair, but some of the windows of the latter require new shutters. The cistern should be put in a serviceable condition in case of the recurrence of fire in the adjacent woods, which endangered the property during the past year. A boat is also recommended.

74. *South Fox Island*.—The wood-work of the dwelling and the iron stairs of the tower require painting, and the cistern needs repairs; in other respects the property is in good order.

75. *Grand Traverse*.—Tower and dwelling in good condition, but some of the wood-work and doors having been constructed from unseasoned lumber have shrunk very much. A boat-house and ways are required.

Mission Point—the point dividing Grand Traverse Bay. The site for a light-house at this point has been selected, and steps have been taken for its purchase. Its survey by the county surveyor has been ordered, and the requisite papers are expected soon to be forwarded for the Attorney General's opinion, and if it be favorable, the building can be erected during the next season.

76. *South Manitou Island*.—Considerable repairs have been made at this station, but they do not include all that was required. The lantern is in good condition, but the tower, the fog-signal structure, and dwelling need painting. Through the channel between South Manitou Island and the main land the principal commerce of the lakes passes, guided by

this light, which should have a lens of a higher order, with greater elevation and a characteristic distinction not readily mistaken. It is also a guide to a harbor of refuge, which is probably more used than any other on the entire chain of lakes, and it is frequently impossible to distinguish the present light from those on board of vessels at anchor. If desirable, Point Betsey, now a fixed light varied by flashes, might be changed to an alternating red and white flash, simply by the introduction of a plate of red glass.

77. *Point Betsey, (Point aux Bees Scies.)*—The repairs authorized at this station have been executed, and measures have been taken to prevent the displacement again of the sand, which rendered necessary the replacing of some of the foundation of the tower.

Manistee.—It is expected that the work at this station will be completed this season.

78. *Grand Point au Sable.*—Tower, lantern, and dwelling are in good order. The sand about the foundation needs close attention to avoid a similar occurrence to that reported at Point Betsey.

Père Marquette.—The condition of this harbor permitting its use as a harbor of refuge a light on one of its piers may be a necessity, which may be supplied by a beacon-light of the sixth order at a cost of about \$2,000; and a site for a keeper's dwelling, on the shore within convenient distance, can be obtained. The total cost is estimated at \$6,000.

White River.—The harbor improvements here being incomplete, the character of the light-house buildings remains undetermined.

79. *Muskegon.*—While the continued absence from the country of one of the owners of the site selected for the new light-house keeps the title still incomplete, steps must be taken to render the present temporary dwelling habitable.

80. *Grand River.*—This station is now in thoroughly good condition. The fog-bell, which was cracked, has been recast and placed in position twelve hundred feet nearer to the end of the pier.

81. *Kalamazoo.*—A new kitchen floor, and a curbing and other slight repairs to the well, will put this station in good order.

South Haven.—Negotiations for the purchase of a site for keeper's dwelling are still in progress; when closed, and the title receives the approval of the Attorney General, it will take but a short time to erect both dwelling and beacon.

82. *St. Joseph's.*—The renovations recommended in last annual report have been carried out, and the station is in good condition.

83. *St. Joseph's beacon.*—While the main light was undergoing repairs, it was decided to put this beacon in a condition to last another season; but the tower and lantern are frail, and as it seems important that a good beacon-light should be kept on the pier, one like that on Chicago pier is recommended. Its cost will not exceed \$3,000.

84. *Michigan City.*—Repairs have been made, and the station is in good order. The sand around the premises has been banked up by the wind, and will require leveling off. Measures should be taken to remove intruders who have settled upon the reservation.

85. *Chicago.*—The repairs required at this station will be made this season. The extension of the piers at this point may require a removal of the light to another position at a not very distant day.

Beacon on north pier.—Has been completed, and only awaits the arrival of its apparatus (of the sixth order) to be illuminated.

86. *Waukegan.*—The necessity for repairs, mentioned in last annual report, still exists at this station, and instructions will be given for the work to be done.

87. *Kenosha*.—General condition is good.

88. *Beacon on north pier*.—The pier was struck by a vessel last fall, and the tower and lantern sustained some damage, which can, however, be repaired.

89. *Racine*.—The crib-work and fencing on the eastern side was damaged by a vessel, and some slight repairs to the keeper's dwelling are needed, all of which will be made this season. A lens illuminating two hundred and twenty-five degrees of the horizon should be used at this point.

90. *Milwaukee*.—Some repairs are needed to the doors, fencing, and cistern. A well should be dug.

91. *North Out Beacon*.—Tower, lantern, and dwelling are in good condition. The pier requires planking, as it is difficult at some seasons to pass to the shore.

92. *Port Washington*.—Small repairs required at this station will receive attention at an early day. The wood-work outside the house and tower needs repainting.

93. *Sheboygan*.—General repairing and painting needed.

94. *Manitowoc*.—When the repairs, now in progress, are completed, this station will be in good condition.

95. *Bayley's Harbor*.—Apparatus is in good condition. The tower, lantern, and dwelling are old and leaky, but no repairs will be needed, as the station will be abandoned on completion of the light-house works on Cana Island.

Bayley's Harbor range lights.—These lights, guiding into the harbor, will be completed, it is expected, by the middle of November next.

Cana Island.—A third-order light-house, with a tower eighty-five feet high, is now in course of construction here, and its completion is expected before the close of navigation.

North Bay.—In last annual report an estimate was submitted of the cost of range lights that would render available this excellent harbor of refuge, and lessen the danger of navigating this part of Lake Michigan. Attention is again invited to the subject, and an appropriation asked.

96. *Ports du Morts*.—Some slight repairs, and general painting, are required. The fog signal engine is in working order, but needs some repairing, which the keeper was authorized to have done. The station is an isolated one, and a new boat, with sails and rigging, should replace the old one worn out,

97. *Pottawatomie*.—Station in good condition, with the exception of plastering in dwelling needing renewal to some extent, and chimney and the cistern to be repaired.

Poverty Island.—The importance of a light at this place will be better recognized by quoting the remarks relating to it in the annual report of 1867, viz: "The already large and rapidly increasing commerce to and from the northern end of Green Bay and lower lake ports now takes in daylight the northern passage from Lake Michigan into Green Bay, because of its being much shorter and more direct. To enable vessels to use the same passage in the night, a light-house on Poverty Island is necessary." The estimate for the same is again submitted, and an appropriation asked.

98. *Point Peninsula*.—In good condition, with the exception that the crack still exists in the front wall of the dwelling, and its cellar needs draining.

99. *Escanaba*.—Condition good. The chimney of the dwelling smokes badly.

100. *Eagle Bluff*.—A new station, and in good order, but dampness is a fault in the cellar. The premises should be fenced in.

101. *Chambers's Island*.—In good order. The trees to the southward slightly obscure the light.

102. *Green Island*.—Tower and dwelling require painting.

103. *Tail Point*.—Station in good condition.

Fox River.—The sum of \$11,000 is available for erecting range lights at this place; but until the work upon the new cut is completed, it is deemed inexpedient to settle upon a site or plan for the beacons.

104. *Round Island*.—A thorough examination of the tower, lantern, and dwelling shows that quite extensive repairs will be required. The tower will have to be elevated, a new lantern provided, plastering renewed, floors mended, and cellar drained. The cost of these renovations is estimated at \$8,000. A new structure on the plan of that at Chambers's Island would cost \$14,000.

105. *Point Iroquois*.—The tower and dwelling are in such bad condition that only temporary repairs, sufficient to make the station tenable, are considered advisable. The tower is built of rubble, laid in very inferior mortar, and the structure seems now to depend upon wood-work which has been inclosed in the walls. A new light-house erected here would likely prove, in the end, an economical measure. Its cost would be about \$18,000, and an appropriation of this sum is asked.

106. *White Fish Point*.—The plastering wants repairing in the dwelling, which, with the tower, requires repainting. The latter, being of iron, should be scraped. A cistern and cellar are much needed for the dwelling. A fog signal would be an important addition to this station.

A coast light between White-Fish Point and Grand Island Harbor, Lake Superior.—In the two last annual reports an appropriation of \$40,000 was recommended for the purpose of establishing a light on this portion of the lake coast. As it is deemed of great importance the recommendation is renewed.

107. *Grand Island*.—Station in good order.

108. *Grand Island Harbor beacon*.—A fourth order lens has been substituted for the steamer's lens first used. Ventilators are needed to the lantern, and hinges should be provided for some of the shutters of the dwelling.

109. *Grand Island Harbor ranges*.—The buildings at this station stand on low, flat ground, a portion of which is very wet, rendering necessary a plank walk between the dwelling and tower. The grounds should be cleaned up and drained. The lantern requires ventilators.

110. *Marquette*.—The dwelling, tower, and apparatus in good condition. The cistern leaks, and should be repaired.

111. *Granite Island*.—The dwelling and tower are substantial structures of granite, from which the light was first exhibited at the opening of navigation last spring. Access to the light-house, and the landing of supplies upon this rock, (sixty feet above the lake,) is very difficult. Davits for hoisting the boat will be furnished this season.

112. *Huron Island*.—A newly erected light first displayed October 20, 1868. Tower and dwelling of granite, and in perfect order.

113. *Portage River*.—The light here is now exhibited from a temporary structure, while the new tower and dwelling are being built. They are approaching completion, the tower being up, and the dwelling ready for plastering. The apparatus is in good repair.

114. *Portage ranges*.—First lighted October 1, 1868. The buildings are in a low marsh, and surrounded by water of several inches depth; the plank walk between the tower and dwelling is overflowed and partly

carried away, rendering the passing back and forth very difficult. The wash caused by passing steamboats made some protection of the river shore near the main light necessary; this is now being done.

Mendota.—In accordance with the provision of the act of Congress making the appropriation of \$14,000 for a light at this place, a contract was entered into, and the structure, to cost \$11,220, will be ready for delivery by the 1st of November next, the time named for its completion.

115. *Manitou.*—The dwelling should be repainted next spring. The tower is of iron, erected in 1861, and has been painted once since. It should be scraped before painting, and thoroughly overhauled.

116. *Gull Rock.*—New station. No repairs required.

117. *Copper Harbor.*—The cistern has been plastered with good cement, and everything at this station is in good order.

118. *Copper Harbor range lights.*—The rear tower at this station has been removed, and a keeper's dwelling, with tower on it, erected in its place. A well and a lightning conductor are needed. Condition of all the property good.

119. *Eagle Harbor.*—No repairs have been made at this station. Its dilapidated condition was described in the last annual report, when an appropriation of \$14,000 was asked, and is again requested.

120. *Eagle River.*—The work of building a new light-house at this place, which was authorized, and an appropriation of \$14,000 made for it, will be commenced in the spring.

121. *Ontonagon.*—In good condition.

Michigan Island.—The light here discontinued and abandoned since 1858, was put in operation again on the 15th of September last. The repairs required amounted to but little less than rebuilding it.

122. *La Pointe.*—The stone for preventing the shifting of the sand around the light-house has been broken up and distributed, and has, thus far, proved effectual. Simultaneously with relighting Michigan Island, the light at La Pointe was changed from white to red.

123. *Raspberry Island.*—The repairs and improvements at this station, for which a special appropriation was made last year, are nearly completed.

124. *Minnesota Point.*—This station is now undergoing repairs, for which a special appropriation was made.

Pier-head lights.—In both this and the tenth district the piers at many of the harbors have recently been extended by the government, leaving the lights built upon them some distance from the pier-head, and other modifications of the harbor improvements have been made, so that the lights intended to guide into the harbor have in several instances become useless in their present position. It is recommended that authority be given the board to properly mark all pier-heads belonging to the government. The lights will be of the smallest and least expensive kind, and if the authority asked for be granted they can be established from the general fund without any additional appropriation.

BUOYS ACTUALLY IN POSITION.

The buoyage of the district is in good condition, except where the contrary is stated.

St. Clair Flats.—Within the past year no change has been made in the buoyage. Nine buoys, four black and five red, are used to mark the present entrance to St. Clair River, and will still be required after the completion of the new cut now in progress.

Saginaw Bay and River.—A second-class iron can-buoy, painted red

is placed at the entrance of the new cut, opposite to which there is a black spar buoy. In addition to these there are seven black and six red buoys, which are placed at regular intervals in the cut, with the exception of the odd black buoy, which marks the turning point in the river. This rearrangement of the buoys has been recently made, and it is believed will answer all purposes required of buoys.

Spectacle Reef.—A first-class iron can-buoy, painted red, was placed, the present season, upon this very dangerous reef, which lies twelve miles east of the eastern end of Bois Blanc Island. The buoy is placed in sixteen feet water, and between the two shoals.

St. Martin's, or Garden City Shoals.—A first-class iron can-buoy, painted black, has been placed, the present season, in 15 feet water, on the outer end of this shoal. The shoal is the outer of a series making off from the main land, and bears northeast by east half east from Bois Blanc light-house. It is directly in the track of vessels engaged in trade between the ports of Lake Michigan and Lake Superior, and the marking it with a buoy has given great satisfaction.

Graham Shoals, Straits of Mackinac, consist of two shoals, one and a quarter miles from each other, and are serious obstacles to navigation, particularly to all vessels compelled to beat through the straits. At the beginning of the season these shoals were marked, for the first time, by a second-class iron can-buoy, painted red, placed on the larger one, in 14 feet water, and a third-class iron can-buoy, painted white, in 12 feet water, on the smaller. The buoys are placed on the southern side of the respective shoals.

St. Helena Shoal.—This is a very dangerous shoal, with but 6 feet of water upon it, lying two miles due west from the northern end of St. Helena Island, in the Straits of Mackinac, and immediately in the course of vessels seeking refuge under the island, where excellent shelter is afforded from westerly winds, and is much used. Numerous disasters have occurred by vessels striking upon it, and it is proposed to mark it by a second-class iron can-buoy, placed in 16 feet water, on the eastern side of the shoal.

White Shoals.—These shoals are three in number, situated $4\frac{1}{2}$ miles northwest from Waugoshance light-house, western end of the Straits of Mackinac. They have from 5 to 15 feet of water upon them. An idea of the obstacle to navigation presented by these shoals, and the great danger to commerce, may be obtained from the fact that the entire commerce between ports on Lake Michigan, Green Bay, and their tributaries, and ports on the other lakes, passes between these shoals and the light-house. They are not marked at present, but it is proposed to place upon them a second-class iron can-buoy.

Gray's Reefs.—These reefs are situated in the northern end of Lake Michigan, 6 miles due west from Waugoshance light-house, and consist of several rocky patches upon which there are but 5 feet of water. They are much dreaded, and probably have been the cause of a greater number of disasters than any other of the many dangers in this locality. It is proposed to mark these reefs by a first-class iron buoy, placed on the eastern side, in 16 feet water.

Hog Island Reef.—This is a rocky shoal, with but 4 feet of water upon it, lying about $3\frac{1}{4}$ miles south-southeast of the southern end of Hog Island, in the neighborhood of the western end of the Straits of Mackinac. It is proposed to mark it by a second-class iron buoy, placed in 16 feet water, on the south side of the reef.

Chicago River.—But one spar buoy at present marks the entrance to this river. It is painted red, and is now placed in 6 feet of water, near the wreck of the schooner Nicaragua.

Racine Reef.—A first-class iron can-buoy, painted red, was this spring placed upon this dangerous reef, heretofore unmarked. It is placed on the inside of the reef in 17 feet of water.

Sheboygan Reef.—This reef, which lies off the town of Sheboygan, is marked by two red, spar buoys, one being placed in 18 feet of water, on the northern end of the reef, and the other in 16 feet of water at the southern end.

Point Peninsula, Green Bay.—To mark the end of the spit making off from the point there is a spar buoy, painted red, and placed in 12 feet water. Outside this buoy, and one and a quarter miles distant, there is a small shoal, having but 9 feet of water upon it, which is marked by a third-class iron can-buoy, painted with red and black horizontal stripes. The buoy is placed in 13 feet water, on the north side of the obstruction, and about 300 yards distant from the shoalest spot. There is a good channel, for vessels of ordinary draught, between the two buoys.

Sand Point, Green Bay.—This buoy is painted black, and is placed in eleven feet water, on the extreme end of the point, upon which is built the light-house near Escanaba, and is a guide to vessels entering the harbor.

Whale's Back, Green Bay.—The second-class iron can-buoy, that went adrift from this shoal last fall was recovered and placed in position this spring. The buoy is painted red, and is set in fifteen feet water on the north side of the reef, about 500 feet from the shoalest spot. The reef extends one and a half miles from northwest by north to southeast by south, and should be marked by a day beacon, for which an estimate is submitted.

Horseshoe Reef, Green Bay.—The second-class iron can-buoy that went adrift last fall was recovered and replaced in position this spring. It is painted black, and placed in fourteen feet water on the south side of the reef. A large rock, on which is but five feet of water, lies northeast from the buoy, and distant 500 yards.

Green Bay Channel.—A twelve-foot channel has been recently dredged near the mouth of Fox River, and an additional red spar-buoy placed between buoys Nos. 18 and 20, as a guide through it. There are now eleven red buoys and one black one in position.

Sault Ste Marie River.—A black barrel-buoy has been substituted for black spar-buoy No. 49, and an additional red barrel-buoy has been placed between black spar-buoy No. 51 and red spar-buoy No. 48, to mark a dangerous rock just above Topsail Island. No alteration in the buoys will arise from the cut now being made through Big Lake George.

In the Neebish channel the spar buoys are frequently carried under by the rapidity of the current, on which account it is proposed to substitute barrel buoys.

If the West Neebish Channel is improved, additional buoys will be required to mark it.

There are now forty-seven spar buoys and eight barrel buoys in position to indicate the channel through Sault Ste Marie River out into the waters of Lake Superior.

Superior Bay, head of Lake Superior.—Instructions have been given to buoy this bay from its entrance up to Rice's Point—a distance of five and a half miles.

TENDERS.

On May 11, the steam tender Haze left Detroit for the purpose of placing the iron buoys on Spectacle reef, St. Martin's or Garden City Reef, Graham Shoals, Whale's Back Reef, Horseshoe Reef, and Racine

Reef. This service was well performed, as well as valuable incidental service, such as conveying a constructing party from Detroit to McGulpin's Point, recovering the moorings belonging to the buoys which went adrift last fall from Whale's Back and Horseshoe Reefs, delivering boats to South Fox and Chambers's Island light-stations, and on her return stopped at Alpena on business connected with the title to the site of the Presque Isle ranges.

From June 8 until July 13 she was engaged in delivering supplies, &c., to the light stations in the tenth district.

On July 17 she left Detroit for the purpose of supplying the light-houses in the eleventh district, which was duly accomplished. No repairs of any importance have been made to the Haze since those at the beginning of last year, already reported. A careful examination of her engines and boiler has been made, and the boiler tested, without developing any important defects. The slight repairs required will be made, including a new wheel, which was broken during her supply tour. Her hull also requires some necessary but not extensive repairs.

The sailing tender Belle.—This schooner has been stationed at Mackinac, attending the working party at Waugoshance. After this work was transferred to the charge of General Reynolds, moorings near Waugoshance pier were provided for the vessel, where she lies within hailing distance of the work, except when absent on duty. She has made one trip to Detroit, loaded with machinery, from Waugoshance, and has returned with a load of cement, lumber, and other materials, for the same place; lime and illuminating apparatus for Sturgeon Point light-house, and a third-order lens for Cana Island light-house, which she is to deliver there, together with the lantern and other materials, so soon as she can be spared for a few days from Waugoshance. It is also expected that before the close of navigation she will deliver at the latter place the brick for building a keeper's dwelling.

DEPOTS.

Since the last annual report no change has occurred at the light-house depot in Detroit. The grounds occupied for the purpose belong to the government, and were recently transferred to the light-house establishment for its permanent use and occupation.

Plans for the general improvement of this depot have been agreed upon by the engineer and the inspector of the eleventh district, but have not yet been acted upon by the Board. The present condition of the depot is such that, with slight repairs, it will answer the purpose for a time yet. It is not proposed at present to take any steps which will require an appropriation specially applicable to the work.

TWELFTH DISTRICT.

In this district, embracing all aids to navigation on the Pacific coast of the United States, south of the 41st parallel of latitude, there are—

Light-houses	10
Light-vessels	None.
Beacons, (unlighted)	None.
Buoys, (actually in position)	17
Buoys, (spare, to supply losses)	4
Tenders, (steam)	1
Tenders, (sailing)	None.

The following is a statement of the operations in this district during the past year, together with the present condition of the existing aids to navigation and the requirements.

365. *Point Loma, Cal.*—Small repairs are needed, and will be attended to this year at this station, on the cistern, gutters, and roof of kitchen. With the exception of these small needs the station is in good order and condition, and the light well kept.

366. *Santa Barbara, Cal.*—Small repairs are needed, and will be made at this station during the present year, to cellar windows, outhouse, and pipe to cistern. With these exceptions the buildings are in good condition. At the date of the last inspection the station was not in an entirely satisfactory condition, and the keeper was directed to carry out the regulations strictly.

367. *Point Conception, Cal.*—The cistern at this station has been rendered unserviceable, doubtless from the effects of the earthquake last year. The necessary steps have been taken to repair the cistern. The station, with this exception, is in good order and condition. The fog-bell machinery is in good order and condition.

368. *Point Pinos, Cal.*—The keeper's dwelling requires a new roof and one of the rooms needs re-plastering. This work would have been done some time since, but for the fact that the title to the site was under judicial investigation. The question of title having been recently decided by the court in California, the light can only be continued by a compromise with the claimants of the land upon which the buildings are erected, or by appraisal of a jury, as provided by the laws of the State.

Santa Cruz.—This structure will be a duplicate of that at Ediz Hook, W. T. It consists of a wooden dwelling on a brick foundation and cellar walls, and surmounted by a wooden tower for the lantern and lens. With the exception of the lantern and lens the building is complete. It was built by contract, for the sum of \$4,350 in coin, the lantern and illuminating apparatus not being included in the contract, but furnished by the Board.

Point Año Nuevo, or vicinity.—The building of this station has been delayed by the extravagant sum demanded for a site. The proper position for the light has been a matter of much consideration, and it is doubtful which of the two, the island at Point Año Nuevo, or Pigeon Point, six miles distant, would best subserve the interests of navigation. But both points are upon the same rancho, (Punta del Año Nuevo,) and it was not possible to obtain a site at either upon such terms as the Board could agree to. Finally, the main land at Point Año Nuevo passed into the hands of other persons, who offered a site of twenty acres for the sum of \$5,000 in currency, and this was accepted. Afterwards, an offer of the same amount was made for a site at Pigeon Point, still in the hands of the same owners, and this they have agreed to accept rather than have the light established at the other point. As soon as it is possible to have the title confirmed, there will be no delay in putting up the necessary structures, plans for which are already prepared. However, should there be promise of any considerable delay upon the part of the owners, in making a title to the United States, the buildings will be erected on the main land at Point Año Nuevo.

369. *Farrallon, off entrance to San Francisco, Cal.*—The condition of the tower and buildings at this isolated light station is good, and the light well kept. Small repairs were needed and have been made to the gutters, pipes to cistern, and the lantern. A new roof was put on the dwelling during the year.

370. *Point Bonita, Cal.*—This station only needs a new floor to the kitchen, and new steps to the front door, to render it in every respect in good order and condition. The light and fog-bell are well kept. The fog-bell machinery is in good repair and order.

371. *Fort Point.*—Extensive repairs were needed, and have been made at this station during the year, including keeper's dwelling, lantern glass, fog-bell house, and machinery. The station is now in good order and condition.

372. *Alcatraz, San Francisco, Cal.*—No repairs have been made, nor are any needed at this time. The tower, buildings, fog-bell, and appurtenances are in good order and the light is well kept.

Point Reyes.—At the beginning of the present year proceedings were ordered under the laws of the State of California for the condemnation of a site at this point, the owners of the property having demanded a most exorbitant sum for what was intrinsically worthless. After the proceedings were commenced, a notice was received from the owners, in which they offered to sell to the government what land and privileges were required, for the comparatively moderate sum of \$6,000 in United States gold coin. Inasmuch as the cost of condemnation would have been nearly if not quite as great, and the delay very considerable, the Board accepted this offer, and a deed has been made, which was approved by the Attorney General of the United States, the deed recorded, and the purchase-money paid; so that after negotiating for fifteen years the United States is in possession of the requisite site at the Point, and landing privileges in Drake's Bay, and the last obstacle to an early beginning of the work removed. The next step to be taken (it actually preceded the purchase) was to select the exact site to be occupied by the light and fog signal. The high, bold, and rocky character of the Point made this a very difficult matter; but it is believed the one selected is the best under all conditions. The amount available for the work is \$49,288 12, and is quite inadequate to the completion of the station, and an additional appropriation of \$45,000 is asked for.

Point Arena.—The Point itself is a narrow peninsula forming a plateau from two hundred to three hundred feet in width, for a length of eight hundred feet in an easterly direction, when it suddenly widens. The ground is nearly horizontal, and bounded on the water side by a nearly vertical bluff of fifty feet in height from the water surface. It is composed of an argillaceous stone, the exposed bluff surface of which, acted upon by the weather, is much cracked, exhibiting a dip considerably to the horizon. The stone is not suitable for building purposes. The exact site selected for the tower is three hundred and seventy feet from the extremity of the point, and that for the dwelling is fifty feet in rear of the tower. On July 30, last, the workmen with all the necessary tools, together with a quantity of cement and lime, reached the Point. The excavations for the foundations of the tower, oil-house, and dwelling were commenced the next day and finished during the month of August; derricks were erected to hoist stones from the beach, sand was hauled, stones for concrete broken, and the concrete foundations laid, and a flume to conduct water to the site constructed. The cement, lime, iron work, doors, sash, moldings, laths, shingles, nails, hardware, &c., &c., were purchased in San Francisco, and shipped on vessels to Point Arena port, transferred to lighters, landed at the landing, and then hauled a distance of four miles to the site of the light-house, at a cost for transportation as follows, viz: From San Francisco to Point Arena port, \$4 to \$5 per ton; lightering from vessel to landing, \$1 50 per ton; hauling from landing to site, \$4 per ton; or a total of \$10 50 per ton (in gold) for all materials shipped from San Francisco. A contract has been made for furnishing five hundred thousand bricks to be made on the ground. The first kiln was burnt in the spring of this year, but upon inspection were found not to be up to the prescribed

standard, and were therefore rejected. A second kiln was burned, and found to contain a large number of good quality brick. A third kiln is now in readiness to be burned, and presuming that the contractor will improve upon the last kiln, it is hoped that the bricks in it will be of even better quality, and that a sufficient number can be accepted to make up the number contracted for. One hundred and fourteen thousand selected brick for the outside courses of the tower were shipped from San Francisco. On September 18, the masonry of the tower and other buildings was at a height of seven feet above the surface of the ground. If nothing unforeseen occurs it is expected that the tower will be ready to receive the lantern and illuminating apparatus by December 1, and the light shown early in 1870.

374. *Cape Mendocino*.—As reported last year, the lantern for this light-house reached San Francisco in February, 1868, and after waiting until the 20th July for the lens, and it not arriving, it was decided to send the tower (manufactured in San Francisco) and lantern to the Cape, as it would take several months to transport them there and put them up, and it was hoped that the lens would meanwhile reach San Francisco. This occurred, and on August 5 the lens was shipped to the Cape. From the experience of the previous year in landing materials at the Cape, and the serious delay and expense that would have to be incurred should any part of the iron work or lens apparatus be lost or broken in landing, it was determined to ship all the materials for the tower together with the lantern and illuminating apparatus, to Eureka, Humboldt Bay, and to transport them by wagons to the Cape, some forty miles distant. In November everything was ready for the exhibition of the light, and after proper notice it was shown for the first time on the night of December 1, 1868, and this important and very difficult work was considered as completed. During the winter of 1867-'68, immediately after the completion of the dwelling-house, several small cracks appeared in the walls, showing that the structure had not settled uniformly; but no new cracks have since been developed, and no fears are entertained regarding the stability of the building. When the light-house was about to be commenced, the rocky slope on which it was to be built had to be made level to receive the concrete of the foundation. In summer this rock is very hard, but in winter it absorbs water to such an extent as to become soft; so much so, in localities not far distant, that masses of the steep bluffs sometimes slide off into the sea. It is possible that such a slide on a small scale might occur on the steep bank just above the tower, which was left in making the excavation. As a proper precaution it is deemed advisable to slope the earth or rock above the tower to a more gentle inclination, and to cover this grade with a bed of concrete of sufficient thickness, and about twenty-five feet in width on each side of the center of the tower, with a large drain at the top and a smaller one at the bottom, by which means all the water from the mountain side, the summit of which is nine hundred feet above the tower, will be diverted to the right and left before reaching the tower, and the foundation thus protected. The materials required to do this have been shipped to the Cape. When the dwelling-house at this place was built, brick for the purpose, including a sufficient number for two cisterns, were shipped from San Francisco. In consequence of the inclemency of the weather, a small portion were not landed, and therefore the cisterns were not built. At the time this was considered of but little importance, because there was a spring near the house where a sufficient, though not abundant supply, of water was obtained. This year, however, this spring has almost entirely failed,

473. *Humboldt*.—This station is in good condition. Some small repairs are needed to the interior of the keeper's dwelling, but not of sufficient importance to justify the expense of sending mechanics so far. A boat-house, ways, and landing for the boat, and a plank walk leading from the dwelling to the landing are required and will be provided. The boat needs extensive repairs, which will be made. The foundation of this structure appears to be quite secure, as sand dunes are forming around it between it and the ocean beach.

The buoys in San Diego Harbor, San Francisco Harbor, Sacramento River, at Mare Island Straits, in Suisun Bay, &c., and in Humboldt Bay, are in their proper positions. They were overhauled and repaired this autumn as usual. Spare buoys are kept in order ready to meet losses and some as reliefs.

The steam tender Shubrick has been employed as usual on the entire Pacific Coast, in attending to the buoys, delivering supplies and materials to light stations, and transporting the Inspector and Engineer on inspecting tours. This vessel cannot adequately perform all the duties required on this extended coast. The number of aids to navigation have greatly increased since this vessel was sent to the Pacific coast, and the remoteness and isolation of most of the stations, and the difficulty attending visits to them by land, render it indispensable that they should be frequently visited by the tender. This tender, with the assistance of another employed north of the 41st parallel of latitude, would be able, with good management and industry, to afford every needful assistance to all the lights and other aids on this distant coast. It is hoped therefore that Congress will see the propriety and necessity for authorizing the estimated amount for another tender.

Light-houses	9
Light vessels	None.
Beacons, (unlighted)	None.
Buoys actually in position	16
Spare buoys to supply losses, &c	16
Tenders, (steam,) employed in the twelfth and thirteenth districts	1
Tenders, (sailing)	None.

The following is a statement showing the operations with the thirteenth district during the past year, the present condition of existing

aids to navigation, the requirements for their improvement, and what additions are necessary to render navigation safe and easy.

375. *Crescent City light house, Cal.*—The buildings at this station require very extensive and expensive repairs. The floor and rafter timbers are rotten, and although they are at present well supported by props, they must soon be removed and new ones substituted. The roadway having been destroyed by washings, a new one is at present under construction, with a strong bulkhead to support it. The illuminating apparatus and other necessary appliances for exhibiting the light are in good order and condition and the light properly kept.

Cape Blanco.—The requisite preparations for the works to be erected at this station could not be made until the season was so far advanced as to render inexpedient any attempt to build them before next season. The amount of rain-fall at Cape Blanco is excessive, being equalled at only two other points in the United States where records have been kept. Consequently any work, after the setting in of the rainy season, could only be prosecuted at very great disadvantage and resulting expense. Meanwhile, the cape has been cleared of timber, which has had the effect, it is said, to considerably diminish the amount of fog in that locality.

An accurate survey of the light-house grounds has been made, the limits staked out, and the exact site of the tower selected. It was at first thought that a focal plane at a height above the ground of eighteen feet would suffice, but the survey developed the fact that at this height the edges of the bluff would intercept the light, provided the tower were placed at the point selected in the center of the cape, which should be the case, in view of the fact that the faces of the bluff are gradually wasting away under the action of the sea. The height of the focal plane above the ground will be established at 50 feet, which will obviate the whole difficulty. Having every reason to believe that much money could be saved, if brick could be made at the cape instead of bringing them from San Francisco, at an enormous expense for transportation, an agreement was made with a person who lived in the vicinity, to furnish two hundred thousand brick, at the light-house site, for \$25 per thousand, about one-third the cost of transportation alone from San Francisco. About eighty thousand of these brick, made last fall, were of fair quality, and were accepted and paid for. The second kiln burned this spring, were not of a good enough quality, and have been rejected.

376. *Cape Gregory, (Arago,) Oregon.*—No other repairs have been made, during the past year at this station, than such as the keepers are required to make with the materials supplied to them for that purpose. The light has been well kept, and the illuminating apparatus is in good order and condition.

377. *Cape Hancock, Washington Territory.*—No repairs have been made at this station during the past year, and none are required at this time. The light is properly kept, and the illuminating apparatus and fog-bell are in good condition, though the latter has but little value, owing to the distance at which the navigator wishes to hear it.

378. *Shoal Water Bay, Washington Territory.*—Necessary repairs were in progress at the date of the last report. No repairs have been made during the present year, and the station is in good order and condition. Instructions have been given to have shrubs, which grow well in the sand, planted around and about the bulkhead to prevent the sand from being drifted by heavy winds.

379. *Cape Flattery, entrance to the Straits of Fuca.*—No repairs have

been made at this station during the present year. The station received special attention last year, when all necessary repairs were made. A small storehouse and a shed for wood will be built at an early day.

380. *New Dungeness, Straits of Fuca*.—The repairs in progress at this station at the date of the last report have been completed. No expenditure for repairs has been required during the present year.

381. *Smith's, or Blunt's Island, entrance to Puget's Sound*.—No repairs have been made at this station during the past year. The station is in good order and condition and the light properly kept.

382. *Admiralty Head, Puget's Sound*.—Considerable repairs were made at this station last year and which were in progress at the date of the last report. No repairs have been made during the present year. The station is in good order and condition.

383. *Ediz Hook, Puget's Sound*.—The repairs which were in progress at the date of the last report have been completed. No repairs have been made during the present year, and none are needed at this time.

BUOYS.

The buoys in the south channel of the Columbia River, on the bar, to mark the entrance in Cathlamet Bay, and at New Dungeness, have been kept in their positions and carefully attended by the tender.

Spare buoys have been kept in repair and in readiness for use at Astoria, Oregon.

TENDERS.

There is no tender belonging specially to this district. The steam tender Shubrick has been employed in this and the twelfth district in looking after the buoys, transporting and delivering supplies to the different light stations, and in inspecting the lights.

The great increase in the number of aids to navigation in this district within a few years, and the rapidly increasing numbers of vessels of commerce visiting this coast, calling for increased vigilance in the management and care of the aids to navigation, render additional facilities for doing so indispensable. The mouth of the Columbia River and the channels leading from it are dangerous at all times. The absence of a buoy from its proper position, or one out of position, might be the means of wrecking many vessels; the necessity, therefore, for a suitable vessel to examine the bar and channels after every gale of wind and freshet in the river, has become so apparent to the board that an estimate will be submitted to Congress for an appropriation to build a tender for this district.

All of which is respectfully submitted.

W. B. SHUBRICK, *Chairman*.

THORNTON A. JENKINS, *Naval Secretary*.

O. M. POE, *Engineer Secretary*.

REPORT ON THE FINANCES.

APPENDIX TO SECRETARY'S REPORT.

Returns by award of the United States Court of Claims of proceeds of property seized as captured or abandoned under act of March 12, 1863, paid up to June 30, 1869.

Date.	Name.	Amount.	Date.	Name.	Amount.
Aug. 31, 1867	Robert H. McCrosky	\$5,404 05	Apr. 10, 1868	Ernest Waltjen	\$2,836 40
Aug. 31, 1867	William Markham	3,602 70	Apr. 10, 1868	John McMahon	1,049 60
Aug. 31, 1867	John Silvey	14,050 53	Apr. 10, 1868	Timothy Claffy	4,329 60
Sept. 28, 1867	John Deighen	2,886 32	Apr. 11, 1868	Est. of Thomas Igoo	7,084 80
Sept. 28, 1867	Margaret Bond	2,749 92	Apr. 15, 1868	Charles D. Ahrens	1,836 80
Sept. 30, 1867	Samuel G. Courtney	3,673 49	Apr. 15, 1868	Eliza Hillborn	918 40
Sept. 30, 1867	Joseph Purcell	18,236 05	Apr. 15, 1868	Randolph L. Mott	114,146 04
Sept. 30, 1867	Joshua D. Geddings	1,180 77	Apr. 15, 1868	Paul B. Barringer	32,573 80
Sept. 30, 1867	Joseph Mertens	3,673 49	Apr. 15, 1868	James B. McElhose	3,074 52
Sept. 30, 1867	Patrick J. Coogen	16,399 50	Apr. 17, 1868	Jacob Meyer	8,828 00
Oct. 1, 1867	Patrick Moran	10,364 49	Apr. 20, 1868	John and James Lynch	38,909 16
Oct. 2, 1867	George I. Cunningham	12,201 23	Apr. 20, 1868	Martha E. Street	1,901 12
Oct. 2, 1867	Celestine Eslava	25,849 27	Apr. 20, 1868	Levi C. Wells	4,683 51
Oct. 3, 1867	John W. Carmalt	8,532 83	Apr. 21, 1868	Finley Y. Clark	2,850 82
Jan. 21, 1868	Thomas P. Rubey	1,210 48	Apr. 21, 1868	Elias and Morris Brown	9,181 12
Jan. 21, 1868	Selina Wilkinson	656 00	Apr. 21, 1868	Simon Gerstmann	16,773 30
Jan. 21, 1868	Henry G. Thomas	131 20	May 9, 1868	Peter A. Fennerty	1,458 00
Jan. 21, 1868	William T. Oliver	262 40	May 21, 1868	Thomas Cole	262 40
Jan. 21, 1868	Bartholomew Foley	26,846 48	May 21, 1868	Joseph F. M. Dereef	262 40
Jan. 30, 1868	Benjamin Keils	4,542 48	June 15, 1868	John N. Mott	9,716 49
Feb. 3, 1868	John H. Graver	11,676 80	June 19, 1868	George W. Turner	22,074 03
Feb. 4, 1868	Theodore Koester	656 00	June 20, 1868	Lorenzo F. Potter	3,441 28
Feb. 10, 1868	Helen Aubert	26,032 60	June 24, 1868	John A. Hudnall	43,958 60
Mar. 3, 1868	Max S. Meyer	11,771 12	July 3, 1868	James Armstrong	6,688 44
Apr. 3, 1868	Edward Reynolds	3,936 00	July 3, 1868	James F. Carroll	247 72
Apr. 3, 1868	Roderick Byrnes	8,428 96	July 3, 1868	Henry West	247 72
Apr. 4, 1868	John H. Bruning	1,968 00	July 3, 1868	James Rudolph	495 44
Apr. 4, 1868	Angelo Smith	393 60	July 3, 1868	T. and Kate Kenney	354 16
Apr. 8, 1868	Smith Howe	1,049 60	Aug. 4, 1868	John J. Fain	*1,077 00
Apr. 8, 1868	Olivia S. Edmonds	1,049 60	Aug. 12, 1868	Moses Adler	13,333 09
Apr. 8, 1868	George Shrewsbury	3,673 60	June 11, 1869	William M. Lowry	*8,720 86
Apr. 8, 1868	Enoch T. Hancock	4,198 40	June 11, 1869	Julius A. Hayden	*50,581 60
Apr. 8, 1868	Sarah Watts	1,393 68	June 14, 1869	Elisha Hunt	*8,720 00
Apr. 8, 1868	Thomas Aiken	1,393 60			
Apr. 8, 1868	Rebecca Ficken	6,953 60			
Apr. 8, 1868	Elias Garden	6,297 00			
Apr. 9, 1868	Varina C. Gaither	58,422 98			
				Total	733,414 94

* NOTE.—The amounts marked with an asterisk (*) are also included in the Register's report as paid out of the miscellaneous appropriation for judgments of the Court of Claims. The error arose from an oversight, and will be corrected in the next fiscal year.