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DEPARTMENT OF COMMERCE AND LABOR

COAST AND GEODETIC SURVEY

O. H. TITTMANN, Superintendent

SURVEY OF OYSTER BARS

WORCESTER COUNTY MARYLAND

DESCRIPTION OF BOUNDARIES AND LANDMARKS AND REPORT
OF WORK OF UNITED STATES COAST AND GEODETIC SUR-
VEY IN COOPERATION WITH UNITED STATES BUREAU OF
FISHERIES AND MARYLAND SHELL FISH COMMISSION

By C. C. YATES

CHIEF OF COAST AND GEODETIC SURVEY PARTY
ASSISTANT, COAST AND GEODETIC SURVEY

WASHINGTON
GOVERNMENT PRINTING OFFICE

1909

DEPARTMENT OF COMMERCE AND LABOR

U.S. COAST AND GEODETIC SURVEY

O. H. TITTMANN, Superintendent

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LETTER OF SUBMITTAL.

DEPARTMENT OF COMMERCE AND LABOR,
COAST AND GEODETIC SURVEY,
Washington, April 10, 1909.

SIR: I have the honor to transmit herewith a report of the officer detailed from the Coast and Geodetic Survey to cooperate with the Bureau of Fisheries and the Maryland Shell Fish Commission in surveying the oyster bars of the State of Maryland, and certain technical results which are necessary for the interpretation and use of the plats of the survey made by the Government.

This work has been done under the provisions of the act of Congress entitled "An act to authorize the Secretary of Commerce and Labor to cooperate, through the Bureau of the Coast and Geodetic Survey and the Bureau of Fisheries, with the shell fish commissioners of the State of Maryland in making surveys of the natural oyster beds, bars, and rocks in the waters within the State of Maryland," approved May 26, 1906, and of the acts of Congress making appropriations for sundry civil expenses of the Government for the fiscal years ending June 30, 1907, 1908, and 1909.

Respectfully,

O. H. TITTMANN, *Superintendent.*

TO HON. CHARLES NAGEL,
Secretary of Commerce and Labor.

CERTIFICATION.

ANNAPOLIS, MD., *April 8, 1909.*

The following publication is certified to contain correct technical descriptions of all boundaries and landmarks established in the waters of Worcester County by the Maryland Shell Fish Commission in cooperation with the United States Coast and Geodetic Survey.

C. C. YATES,
Chief of Coast and Geodetic Survey Party,
Assistant, Coast and Geodetic Survey.

ANNAPOLIS, MD., *April 8, 1909.*

Examined and certified to be correct.

WALTER J. MITCHELL,
CASWELL GRAVE,
BENJAMIN K. GREEN,
Maryland Shell Fish Commission.
SWEPSON EARLE,
Hydrographic Engineer.

NOTE.—Certified copies of this publication and of the charts of the natural oyster bars of Worcester County were filed in the office of the clerk of the circuit court of Worcester County and in the office of the Board of Shell Fish Commissioners, at Annapolis, on April 12, 1909.

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SURVEY OF OYSTER BARS, WORCESTER COUNTY, MD.

INTRODUCTION.

PUBLICATIONS.

The preparation of publications relating to the survey of the oyster bars of Maryland has been divided between the Government and the State in accordance with the laws ^a authorizing the work and the natural division of the surveying operations ^b of the cooperating forces.

The publications prepared and issued by the Government under the direction of the Superintendent of the Coast and Geodetic Survey consist of a series of charts and a technical report for each county surveyed.^c The charts show all legal boundaries of oyster bars within the adopted boundaries of the waters opened up for leasing with each county, and the location of all landmarks (Coast and Geodetic Survey triangulation stations) used as a foundation for the delineation of these various boundaries. The technical report gives technical and legal descriptions of all oyster-bar and other boundaries, and descriptions of all landmarks shown on the charts, and includes the report of the representative of the Coast and Geodetic Survey in charge of the work of that Service in cooperation with the Bureau of Fisheries and the Maryland Shell Fish Commission. These charts and technical reports are prepared and certified for file with the courts and the Commission, as required by the laws of the State, and contain all information necessary to make a permanent record of the work of the Commission and the Government for all future requirements of the courts, or for any resurveys that may become necessary.^d

The publications prepared and issued by the State under the direction of the Shell Fish Commission consist of annual reports^e of all the operations of the Commission

^a See Appendix A for laws relating to the cooperation of the Coast and Geodetic Survey and Bureau of Fisheries with the Maryland Shell Fish Commission.

^b See Appendix C for a summary of the particular surveying operations which constitute an "oyster survey" as now being carried on in Maryland.

^c These charts and technical reports can be obtained by application to the Superintendent of the Coast and Geodetic Survey, at Washington, D. C. The publications ready for issue are those for Anne Arundel, Somerset, Wicomico, and Worcester counties; those for Calvert, St. Marys, and Charles counties are now being prepared.

^d The technical records and charts for each county are published separately on account of the requirements of the oyster-culture laws of the State and the practical considerations which make it desirable to have each county "opened up" for oyster culture as soon as practicable after the completion of its survey. For these reasons and the fact that these reports are each arranged for distribution and use in one county only without reference to other published records, much of the text of this publication is of necessity identical with similar previous publications for other counties.

^e These reports can be obtained by application to the Shell Fish Commission, Annapolis, Md. They are issued annually in October, and the first and second reports are now available for distribution.

performed under the provisions of the laws of Maryland,^a including results of biological and economic oyster investigations, methods and results of the hydrographic survey of the boundaries of oyster bars and crab bottoms, the administrative report and financial statement of the Commission, information relating to oyster culture, methods of surveying and leasing of oyster lots, and much other important matter of legal and scientific value.

These two sets of publications are planned and arranged to supplement each other without unnecessary duplication, and when combined they form a complete report of operations, methods, and results of the work of both the Government and State.^b

COOPERATION OF THE COAST AND GEODETIC SURVEY.

The work of the Coast and Geodetic Survey, as the name of the Service indicates, includes a survey of the coasts of the United States made on a geodetic basis. This has involved the gradual construction of a great framework of interstate triangulation for use as a foundation for detail hydrographic and topographic surveys, from which there has been compiled and published a complete set of charts of the coasts of the United States, including all waters of Maryland where oysters grow. This existing triangulation, hydrography, and topography is essential as a foundation for a correct and practical survey of natural oyster bars; and it being one of the fundamental functions of the Coast and Geodetic Survey to furnish such data, the cooperation of the Coast and Geodetic Survey with the Bureau of Fisheries and the Maryland Shell Fish Commission is a practical and natural development of Government work leading to the conservation and increase of the supply of food.

COOPERATION OF THE BUREAU OF FISHERIES.

The Bureau of Fisheries has cooperated with the Coast and Geodetic Survey and the Maryland Shell Fish Commission principally as an adviser in matters relating to the biological and economic survey of oyster bars and the methods to be employed for that purpose.^c A steam launch, rowing boat, and certain apparatus have also been furnished.

The primary function of the Bureau of Fisheries is to increase the productiveness of marine and fresh waters by such measures as may be best suited to the purpose, and the services rendered in connection with the survey of the oyster bars of Maryland are strictly in line with the fundamental law under which it acts. In certain States other than Maryland similar work has been conducted by the Bureau acting independently, the same ends being attained at greater expense to the Government.

GENERAL STATEMENT OF WORK OF COAST AND GEODETIC SURVEY.^d

The results obtained from the work of the Coast and Geodetic Survey in cooperation with the Bureau of Fisheries and the Maryland Shell Fish Commission need very

^a See Appendix B for an extract from the "Second Report of the Maryland Shell Fish Commission," giving a concise summary of the "Haman Oyster Culture Law."

^b See Appendix D of this publication for "Statistics of results of combined operations of the Government and State."

^c Hon. George M. Bowers, Commissioner of Fisheries, has detailed for this service Dr. H. F. Moore, Assistant, Bureau of Fisheries.

^d For a detail statement of the very large amount of excellent oyster survey work of the Maryland Shell Fish Commission see the "Annual Reports of the Maryland Shell Fish Commission."

little other summary than is indicated by the published "Charts of Natural Oyster Bars" and the scheme of hydrographic projections and triangulation stations shown on the county progress maps attached to each report.

The triangulation has been carried on in accordance with the standard methods of the Coast and Geodetic Survey, making this work and that of the "Descriptions of Triangulation Stations" of permanent value, not only to the State of Maryland in the survey of her oyster bars, but also to the Government for any future work it may do in the regions covered by the oyster-survey operations.

The hydrographic projections and published charts are prepared with all the accuracy permitted by their large scale, especially as to the boundaries of the various shellfish bottoms in relation to landmarks, but this accuracy of location on the charts is further added to and permanently fixed by published technical descriptions which should minimize the probability of any future dispute as to either landmarks or boundaries.

Stated another way and quoting from the report of the "Survey of Oyster Bars of Anne Arundel County:"

The geographic positions of the permanent landmarks and signals have been determined with the usual precision of a trigonometric survey, and their locations at all points necessary to provide ample foundation for the surveying and charting operations permitted great accuracy of definition and location for the natural oyster bar and other boundaries established. At the same time, the very important element of permanency of the positions of boundaries has been secured, as the relocation of geodetic positions can always be accomplished by a competent surveyor, even though the original landmarks and monuments have been washed away, as has been the fate of hundreds of such points established by the Coast and Geodetic Survey on the shores of the Chesapeake Bay during the last sixty-five years.

In fact, when the survey of the oyster bars of Maryland is completed, it is believed that it will stand the test of time and practical use as a working foundation for whatever form the oyster legislation of the future may assume, and that the doing of the work systematically and accurately, once for all, means the establishment of a foundation of a great oyster industry by ineradicably locating the natural oyster bars for the use of the public, and a still greater permanent superstructure of real oyster culture as a reward for individual enterprise, by reason of the integrity of the survey by which the rights of the public are secured.

REPORT OF THE WORK OF THE COAST AND GEODETIC SURVEY IN WORCESTER COUNTY.

INSTRUCTIONS.

The following two letters, together with the laws^a of the United States relating to the subject, constitute the "instructions" received by the chief of the Coast and Geodetic Survey party engaged on work in connection with the Maryland Shell Fish Commission. They are short and definite, but furnish ample authority and leeway for all legitimate development of the cooperation of the Government and the State in the survey of oyster bars. The "free hand" permitted by these orders, together with the aid and many valuable suggestions received from the officers of the Survey at Washington, have proved very beneficial to the work, and are greatly appreciated.

DEPARTMENT OF COMMERCE AND LABOR,
OFFICE OF THE SECRETARY,
Washington, June 2, 1906.

SIR: In reply to your letter of May 28, requesting me to designate officers of the Coast and Geodetic Survey and of the Bureau of Fisheries to cooperate with the State of Maryland in making survey of and locating the natural oyster beds, I have the honor to inform you that Mr. C. C. Yates will be designated to cooperate on the part of the Coast and Geodetic Survey as soon as Congress makes the provisions of the act effective by providing an appropriation for the purpose.

Respectfully,

LAWRENCE O. MURRAY, *Assistant Secretary.*

His Excellency HON. EDWIN WARFIELD,
Governor of Maryland, Annapolis, Md.

DEPARTMENT OF COMMERCE AND LABOR,
COAST AND GEODETIC SURVEY,
Washington, July 3, 1906.

SIR: Upon the receipt of these instructions you will surrender the command, accounts, etc., of the steamer *Endeavor* to the Hydrographic Inspector. * * *

As soon as this transfer is completed you will enter upon the duties of Coast Survey representative on the Shell Fish Commission of Maryland.

You will consult the commissioners, prepare a programme of work, and submit estimates in the usual form.

You are authorized to come to Washington for consultation from time to time as may be necessary.

* * * * *

Very respectfully,

O. H. TITTMANN, *Superintendent.*

Capt. C. C. YATES,
U. S. C. and G. S. Steamer Endeavor, Baltimore, Md.

^a For these laws see Appendix A.

ORGANIZATION AND EQUIPMENT.

The personnel and occupation of the party of the Coast and Geodetic Survey have remained practically unchanged since the beginning of the "oyster survey." Besides the chief of party, it consists of the necessary triangulators, computers, draftsmen, and temporary employees required to carry on both the surveying operations in the field and the preparation for publication of oyster charts and technical records in the Office at Washington.

The transportation equipment for the field work of the party in Worcester County was confined to hired launches and boats, as the waters of that region are too shallow for the use of the type of boats utilized by the Survey and the Commission in Chesapeake Bay.

It being impracticable to move the Shell Fish Commission house boat *Oyster* to the ocean coast of Maryland, the convenient living and office quarters furnished the Government on that vessel had to be exchanged for temporary quarters on shore.

The greater part of the equipment of instruments for the operations of both the Government and State has been furnished by the Coast and Geodetic Survey, and consists of all necessary theodolites, levels, sextants, drafting instruments, hydrometers, etc., required for all field and office work.

CHRONOLOGICAL STATEMENT OF WORK.

The field work in Worcester County dates from November 8, 1907, when the survey in Wicomico County was completed and the entire party moved to Chincoteague, Va., where headquarters were established.

On December 6, 1907, a subparty was organized for field work in the upper part of the county, the work of this party being done from a small house boat which was towed by a gasoline launch.

On December 19, 1907, all field work was closed for the season and office quarters established in Baltimore.^a

No further field work was done in Worcester County until March 23, 1908, when a subparty was organized to complete the triangulation, which work was finished on April 18, 1908.

On March 8, 1909, a subparty was organized to do some additional field work in Somerset County, and at the same time to inspect and replace certain triangulation monuments in Worcester County which were reported to have been injured. This latter work occupied thirteen days and was completed March 30, 1909.

The office work connected with Worcester County, including the preparation of the oyster charts and technical records for publication, has been continued intermittently from the beginning of the field work, on November 8, 1907, to the present time. The delay in the completion of the office work was due to various causes, but chiefly to the desirability of utilizing the new shore line being surveyed for other purposes by a topographic party of the Coast and Geodetic Survey. This topographic work was available for use in the preparation of publications in beginning of present year, and adds greatly to the accuracy and value of the published oyster charts of Worcester County.

^a Office rooms were furnished for the work of the Coast and Geodetic Survey in the new custom-house by courtesy of Hon. William F. Stone, collector of customs.

STATISTICS.^a

Landmarks and triangulation signals erected.....	36
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Triangulation stations occupied for observations of horizontal angles.....	38
Old triangulation stations recovered.....	5
New triangulation stations established.....	43
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Linear miles of shore line covered by triangulation (approximate).....	95
Square miles covered by triangulation (approximate).....	110
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Geographic positions computed.....	45
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Back azimuths and distances computed from corners of boundaries to triangulation stations.....	324
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Descriptions of oyster boundaries prepared for publication.....	28
"Charts of Natural Oyster Bars" prepared for publication.....	3
Progress map prepared for publication.....	1

GENERAL REMARKS.

Before ending this report the representative of the Coast and Geodetic Survey wishes to renew his statement of appreciation of the courteous assistance received from various Government and State officials and others interested in the oyster industry of Maryland, especially to the following:

To his colleague from the Department of Commerce and Labor, Dr. H. F. Moore of the Bureau of Fisheries, whose well-known scientific knowledge of all matters relating to oysters has been of great value to the work.

To Mr. Walter J. Mitchell, chairman of the Maryland Shell Fish Commission, who, by his administrative ability in carrying out the complicated requirements of the oyster laws and by his unflinching tact, has made the cooperation of the various services engaged on the work both agreeable and effective.

To Dr. Caswell Grave, secretary of the Commission, who, as editor of the Commission's annual report and Commissioner in charge of the biological and economic oyster investigations, has been brought into constant contact with the Government work and aided its operations in every way.

To Benjamin K. Green, treasurer of the Commission, who has looked after the equipment and commissary of the house boat in such a way as to add greatly to the comfort and convenience of the party of the Coast and Geodetic Survey.

To Swepson Earle, hydrographic engineer to the Commission, whose knowledge of the work from former service in the Coast and Geodetic Survey has greatly facilitated his practical use of the technical data furnished by the Government.

To Thomas H. Robinson, counsel to the Commission, for courteously furnishing valuable information relating to county boundaries.

And to the many others connected with the Commission or who as residents in the locality where the work was being carried on have greatly assisted by furnishing important information or willing services.

^a These statistics only include field and office work directly performed by the party of the Coast and Geodetic Survey in connection with the oyster survey of Worcester County, and do not include the many thousands of soundings and examinations of the character of the bottom made by the engineers of the Commission, which are of considerable value to the Coast and Geodetic Survey as hydrographic records for future use in connection with the preparation of new editions of charts of the waters of Maryland.

CHARTS AND MAPS.

CHARTS OF NATURAL OYSTER BARS.

The charts ^a of the natural oyster bars of Worcester County, published by the Coast and Geodetic Survey from results of surveys of the Government in cooperation with the Maryland Shell Fish Commission, consist of three sheets covering the greater part of the shores of Chincoteague and Sinepuxent bays, including all oyster-producing bottoms of Worcester County. They are published on a scale of 1 part in 20,000 (approximately 3 $\frac{1}{8}$ inches to a statute mile) and are constructed on polyconic projections which are based on the United States standard datum of the Coast and Geodetic Survey.

These charts show all oyster bars and other boundaries established by the Commission, and are certified for the purpose of filing in the office of the clerk of the circuit court of Worcester County and in the office of the Commission at Annapolis, as required by the oyster laws of Maryland.

In addition to the oyster-bar and other boundaries, the charts show the location and name of all landmarks (U. S. Coast and Geodetic Survey triangulation stations) used in making the survey, together with the hydrography and topography ^b necessary to make the technical definitions and delineations of boundaries readily understandable both by the people engaged in the oyster industry and the general public who may become interested through leasing of barren bottoms for oyster culture.

The names of the oyster bars are those used locally, as nearly as could be ascertained by the hydrographic engineer of the Commission. When there was no local name in common use, a name was selected from one of the prominent features of the vicinity. By the use of recognized names or those that would naturally suggest certain sections of water, it is believed that much confusion will be avoided in the location on the charts of the oyster bars, especially by those not familiar with the use of maps.

The corners of the oyster bars are numbered from 1 to the total number of corners in each area under consideration. Where boundaries adjoin, making one point a corner of two or more oyster bars, these points have two or more numbers, each number corresponding to the bar in which the figure is located. The numbers of the corners correspond with the technical and legal descriptions of this publication under the heading "Boundaries of natural oyster bars."

The landmarks and oyster bars have been grouped in the "Contents" of this publication in accordance with the charts upon which they are shown. To find a

^a These charts can be obtained by application to the Superintendent of the Coast and Geodetic Survey, at Washington, D. C.

^b Much of the detail of the inshore topography was obtained from the excellent map of Worcester County prepared and published by the Maryland Geological Survey under the direction of Dr. William Bullock Clark from surveys of the Maryland Geological Survey in cooperation with the U. S. Geological Survey.

particular oyster bar or landmark which is only known by name, consult the "Contents" and the desired chart and general location will be indicated. To find the name of a bar or landmark which is only known by location, consult the progress map at the end of this publication for the number of the chart on which it is to be found, and then examine the known locality on the chart for the name of the bar or landmark in question.

The contours on the charts showing the depth of water at mean low tide have been taken from the hydrographic sheets of former work of the Coast and Geodetic Survey.

The boundaries of the waters within the "territorial limits of the county" opened up for the leasing with Worcester County are plainly indicated on the charts. A description of this boundary is given in this publication under the heading "Boundaries of the county waters."

The areas in acres of the oyster bars were determined under the direction of the hydrographic engineer of the Commission by two independent planimeter measurements of the areas as delineated on the smooth projections of the Coast and Geodetic Survey. These areas are given in small figures in parentheses on the face of the chart within the boundaries of the different shellfish bottoms.

The symbols used on the charts for the different kinds of boundaries, triangulation stations, contours of depth of water, etc., require no other explanation than that given in the legend and other notes on the face of the charts.

LEASING CHARTS.

The leasing charts of Worcester County, like those for Anne Arundel, Somerset, and Wicomico counties, have been prepared under the direction of the hydrographic engineer of the Commission. These charts are constructed on polyconic projections which are based on the United States standard datum of the Coast and Geodetic Survey. They are made on the scales of 1 part in 5,000 or 1 part in 10,000, as the needs of oyster culture may require. Anne Arundel County required 13 leasing charts, Somerset County 12, Wicomico County 2, and Worcester County 3 to cover their oyster bottoms.

These charts show all the oyster bars, crab bottoms, and clam beds and other boundaries established by the Commission, and also all boundaries of oyster lots leased for the purpose of oyster culture, thus making them comprehensive and valuable records of the results of the operations of the oyster-culture laws.

The lots leased under the provision of the "old 5-acre law" are frequently of irregular shape, but the lots leased under the provision of the new oyster laws must be of rectangular shape by the terms of that act. For this latter purpose the leasing charts have been divided by parallels of latitude and meridians of longitude into small rectangles of 1 acre or 5 acres, as may be best suited to the area under consideration, and prospective leaseholders by the rules of the Commission are compelled to select whole rectangles as far as practicable.

For reasons of the present changeable nature of the number of lots leased and the large number of charts required, the leasing charts are not likely to be published for some years, but they can be seen at any time on file at the offices of the Commission, in Annapolis.

PROJECTIONS.

The polyconic projections ^a covering Worcester County waters are 5 in number and on the scale of 1 part in 10,000. They were constructed by draftsmen of the Coast and Geodetic Survey, who also plotted the sextant positions which determine the location of the legal boundaries of the oyster bars as delineated by the Shell Fish Commission.

A copy of each of these projections, with all the plotted positions of triangulation stations, shore line, sextant positions, and boundaries of oyster bars, was made under the direction of the hydrographic engineer of the Commission by pricking through with a sharp needle the intersections of the projection lines and all other points as plotted on the original sheets.

These projections (in duplicate) are the original records of all oyster-bar and other boundaries established by the Commission, one set being filed in the archives of the Coast and Geodetic Survey, at Washington, and the other set in the office of the Shell Fish Commission, at Annapolis.

PROGRESS MAPS.

The progress map to be found at the end of this publication is on a scale of 1 part in 100,000, and shows in outline the work accomplished by the U. S. Coast and Geodetic Survey in Worcester County and contiguous waters. It gives the scheme of all the charts and smooth projections constructed in connection with the survey, the location and names of all triangulation stations used as a basis for the surveying work, and the "boundaries of county waters" established by the Commission for the purpose of carrying out the laws of Maryland relating to oyster culture.

Besides indicating the amount of work done by the Coast and Geodetic Survey in connection with the work of the Shell Fish Commission, this progress map will be of special value for index purposes to engineers and others searching for the particular chart or projection covering the locality of the oyster bars or landmarks that may be under consideration.

The progress maps ^b accompanying the first and second annual reports of the Maryland Shell Fish Commission were prepared under the direction of the hydrographic engineer of the Commission. They are on the scale of 1 part in 400,000, and show the outline of the tide-water counties of Maryland, with shaded areas to indicate the waters already covered by the operations of the oyster survey.

^a For the scheme of these projections see the progress map at the end of this publication.

^b These maps and reports can be obtained by application to Maryland Shell Fish Commission, Annapolis, Md.

BOUNDARIES OF THE COUNTY WATERS.^a

WATERS WITHIN TERRITORIAL LIMITS OF COUNTY.

The laws of Maryland relating to oyster culture provide that "no person shall be permitted, by lease, assignment, or in any other manner, to acquire a greater amount of land than ten acres situated within the territorial limits of any of the counties, or one hundred acres in any other place."

The boundary line^b between the waters "within the territorial limits" of Worcester County and the waters in "any other place," as established by the Shell Fish Commission for the purpose of carrying out the oyster laws, and delineated on the charts and the smooth projections of the Coast and Geodetic Survey, is identical with the boundary line between the waters of Worcester County and the waters of the adjacent States of Delaware and Virginia excepting the waters of the Atlantic Ocean. Therefore technically all waters opened up for leasing with Worcester County are within the "territorial limits" of that county.

WATERS CONTIGUOUS TO COUNTY.

The oyster laws of Maryland provide that a true and accurate delineation of all natural oyster bars shall be made on copies of charts of the U. S. Coast and Geodetic Survey, "which said copies shall be filed in the office of the said Commissioners in the city of Annapolis," and "in the office of the clerks of the circuit courts for the respective counties wherein the grounds so designated may lie."

For the purpose of carrying out the latter part of this section of the law and for the purpose of establishing the limits of the oyster-culture area to be opened up for leasing with each county surveyed, it is necessary for the Shell Fish Commission to establish a boundary line between the waters contiguous to but not within the territorial limits of each county, and the waters contiguous to but not within the territorial limits of adjacent counties. But technically, as explained under the preceding heading of "Waters within territorial limits of county," there are no "waters contiguous to the county" in Worcester County excepting the waters of the ocean, and therefore there are no waters opened up for leasing with that county in which a person can lease "a greater amount than ten acres."

^a For a complete historical and legal description of the boundaries of the counties of Maryland, the valuable publication entitled "The Counties of Maryland—Their Origin, Boundaries, and Election Districts," prepared by Dr. Edward B. Mathews and published by the Maryland Geological Survey under the direction of Dr. William Bullock Clark, Superintendent, should be consulted, as the boundaries described in this publication have been established and technically defined for the purpose of carrying out the oyster laws of the State, and may or may not be correct for other purposes.

^b See "Charts of Natural Oyster Bars," published by the Coast and Geodetic Survey, and the progress map at the end of this publication.

LANDMARKS (U. S. COAST AND GEODETIC SURVEY TRIANGULATION STATIONS).

EXPLANATION.

The oyster laws of Maryland authorizing the survey to be made by the Shell Fish Commission provide for "an accurate report of said survey, setting forth such a description of landmarks as may be necessary to enable the said board, or their successors, to find and ascertain the boundary lines of said natural oyster beds, bars, and rocks, as shown by delineation on the maps and charts." The law of the United States authorizing the cooperation of the Department of Commerce and Labor in the survey of natural oyster bars of Maryland provides for the erection of "such structures as may be necessary to mark the points of triangulation, so that the same may be used for such future work of the Coast and Geodetic Survey as the said Bureau may be hereafter required to perform in prosecuting the Government coast survey of the navigable waters of the United States located within the State of Maryland."

Under the provisions of the sections of the laws stated above, the markings and descriptions of landmarks must be sufficient for the present and future needs of both the Government and the State. With this end in view, considerable work has been expended in erecting permanent monuments at the triangulation stations and in the proper description of their location.

An effort has been made to arrange the descriptions of location and character of landmarks in a uniform and logical manner. The descriptions start with the assumption that the individual seeking a landmark has only an indefinite idea of its location. They gradually proceed from description of the general locality of a landmark to the descriptions of its immediate surroundings. This is followed by specific details of the character of the center and reference marks and a "round" of reference angles and distances which in themselves frequently contain enough information to furnish an independent and reliable location of the triangulation station.

METHOD OF DESCRIBING TRIANGULATION STATIONS.

The separate descriptions of triangulation stations should not be used without reading the following explanation of the method of describing the triangulation stations, as it contains certain details that are common to all the landmarks described in this publication and which are omitted in the separate descriptions as being needless repetitions.

Name.—The title at the top of each separate description is the name by which the landmark or triangulation station is known and designated in all work and published oyster records or oyster charts of both the Government and State. The selection of the name is usually left to the triangulator establishing the station, and it may or may not have geographic or other significance in reference to the locality.

General locality.—Under this heading is given the general locality of the landmark in reference to well-known and prominent natural or artificial features, such as the nearest body of water, town, river, steamer wharf, well-defined point of land, church, or any other feature that is likely to remain both permanent and prominent.

This heading also covers a reference to the published chart or map which shows the location of the station most clearly. Nearly all the triangulation stations described in this publication are plainly indicated by name and a triangulation symbol on the published charts of oyster bars of Maryland. In this case they are referred to by serial number only, the words "charts of oyster bars of Maryland" being omitted to avoid needless repetition. These published oyster charts are on the large scale of 1 part in 20,000 (approximately $3\frac{1}{8}$ inches to a statute mile) and show the location of the triangulation stations so clearly that in many cases the written descriptions will not be required to find them.

Immediate locality.—Under this heading is given the description of the "observed station" in reference to its immediate surroundings. This is supposed to include a statement of the station's estimated elevation above high water or some other well-defined level of the locality, such as a road or house; the character of the ground on which it is located, such as marsh land, sand beach, cultivated field, or meadow; estimated bearings in points of the compass and estimated distances in yards *from* (not *to*) easily recognized features, such as extreme end of point, edge of bluff, bank of creek, line of telephone poles, shore line, barn, house, fence, ditch, trees, or any other definite detail, such as being on range with the tangent of an island and a clureh; and so forth.

When a standard monument has been established near the station as a "reference station," this heading also covers a statement of the true bearing of the monument in degrees and minutes and its measured distance in meters, as it is the first object that is likely to catch the eye when the immediate vicinity of the desired station is reached and might be mistaken for the center mark of the "observed station" unless special attention is called to it.

The distinction between the "observed station" and "reference station" should be carefully noted by anyone making use of the description of stations for any future surveying operations.

The "observed station" is located at the particular triangulation point covered by the description of stations, and is the one whose geographic position is first computed, as it is the point which was "occupied" and "observed on" for horizontal angles. However, in spite of the primary importance of the location of the "observed station," it will be noted from the description of stations that frequently it is not marked as well as the "reference station," and in many instances has only a pine stub to indicate its position. This is the case for the reason that the necessity of intervisibility of landmarks usually made it compulsory to locate "observed stations" on edges of banks and ends of points of land, which in the tide-water section of Maryland generally means they will be washed away in a short period of years. The past experience of the Coast and Geodetic Survey in this region has shown the great need of "reference stations," if the frequent reestablishment of a new framework of triangulation is to be avoided.

The chief reason and need for the establishment of the "reference station," or secondary station, as it might be well named, is explained in the preceding paragraph, but in several instances other reasons, such as the location of the "observed station"

on an unstable sand dune, in a cultivated field, in front of a residence, or other places objectionable to the landowner, have led to establishment of "reference stations." The location of the "reference station" in relation to the "observed station" is fixed for plotting on charts or for computation of its geographic position by checked measurements of its distances and azimuth from the "observed station."^a

Marks.—Under this heading is given a description of the character of the permanent monuments or other marks of the location of the "observed station," and of the "reference station" where one has been established.

All the marks designated in the descriptions as "the center point of triangle on standard cement monument" are exactly alike. These monuments are made of cement, sand, and gravel, and are 2 feet long and 8 inches square at top and bottom. Their tops are all marked with the same brass mold and show a center hole surrounded by a triangle, with the letters "M. S. F. C." arranged around the vertex and the letters "U. S. C. S." underneath the base of the triangle. The center hole is always in the center of the top of the monument by construction, and if this is found to have been broken off without disturbing the bottom the center of its square section can be used as the location of the station.

All the "standard cement monuments," whether used for marking the "observed station" or "reference station," have been planted upright in exactly the same manner, with their tops projecting 3 or 4 inches above the surface of the ground, unless otherwise stated.

Therefore, as the above facts in reference to the "standard cement monuments" are a constant element in all cases, the repetition of these facts in the description of stations is made needless by this one statement.

References.—Under this heading are given the "rounds" of directions and distances to all objects that might be useful in locating the stations when the surface marks can not be found. It is also contemplated that for general purposes of topography, hydrography, or location of boundaries of oyster bars these references will be sufficient in many cases to relocate the position of an "observed station" or "reference station" when both of them have been destroyed.

The first reference object given in the descriptions is always a triangulation station visible from the station being described, this, if possible, being a light-house, church spire, or other permanent and prominent point. Its direction is taken as being $0^{\circ} 00' 00''$, and the directions of all other objects are measured from it as an initial point, the angles being taken in a clockwise direction (left to right).

The true bearing^b of the initial object is always given in parentheses alongside its name. This furnishes means for the calculation of the bearings of any of the other reference objects for the purposes of locating a station by horizontal angles or for the relocation of corner buoys of oyster-bar boundaries by the method of compass directions described in this publication under the heading of "Boundaries of oyster bars."

^a Geographic coordinates (latitude, longitude, distance, and azimuth) relating to any of the "observed stations" or of the "reference stations" described in this publication can be obtained by application to the Superintendent of the Coast and Geodetic Survey, at Washington, D. C.

^b The mean magnetic variation for Worcester County was $5^{\circ} 55'$ west of north in 1909 and increasing at the rate of $3\frac{1}{2}'$ yearly.

The distances in the last column under "References" are given in three different units, which vary according to their accuracy. The "miles" are statute miles and may be considered only as rough estimates. The "yards" are more accurate, but must be looked on as results generally obtained by pacing or careful estimating. The "meters," however, are accurate to the degree indicated by their decimals and in every case have been measured with a steel tape. In the same manner the accuracy of the directions are indicated by the refinement of angular measure with which they are recorded.

DESCRIPTIONS OF TRIANGULATION STATIONS.

THOROFARE.

General locality.—Western shore of Sinepuxent Bay and southern shore of Isle of Wight Bay on land known as Drum Point. (See progress map.)

Immediate locality.—Observed station is on "Thorofare Farm," about 400 yards from Sinepuxent Bay and 165 yards southwest from the Thorofare. It is in a cultivated field about 8 feet above high-water mark on the second knoll southwest from the Thorofare, 400 yards north of "Thorofare Farm" house, 200 yards west of a wagon trail, and 32 yards southwest of the lowest point of the hollow between the two knolls.

Marks.—Observed station is center point of triangle on standard cement monument buried with top 12 inches below surface of ground. Cement monument marking reference station is in bottom of hollow between the two knolls 51.032 meters N 65° 21' E of observed station and about on range with Isle of Wight Life-Saving Station.

References.—

	°	'	"	
"Hamilton" (S 32° 06' E).....	0	00	00	1 1/2 miles.
Middle of lookout of Ocean City Life-Saving Station.....	5	09	..	1 3/4 miles.
Presbyterian Church spire.....	5	53	..	1 3/4 miles.
Flagstaff on middle of square roof of Atlantic Hotel.....	9	47	..	1 7/8 miles.
Power-house chimney.....	9	53	..	1 7/8 miles.
"Ocean City Water Tower".....	9	55	..	1 3/4 miles.
Ice-plant stacks.....	17	12	..	2 miles.
Between two chimneys on top of Tabor house on Tabor Hill.....	24	01	..	1 3/4 miles.
Chimney of "Thorofare Farm" house.....	35	01	..	1/4 mile.
Chimney on gray house.....	89	00	..	1/2 mile.
Left chimney on white house.....	116	04	..	1 mile.
Left chimney on white house.....	150	05	..	3 miles.
REFERENCE STATION.....	245	21	20	51.032 meters.
Center of Isle of Wight Life-Saving Station.....	245	24	30	4 miles.
"Convent Water Tower".....	334	30	20	1 1/4 miles.
Episcopal Church spire.....	359	05	..	1 1/2 miles.

COLLIER.

General locality.—Eastern shore of Sinepuxent Bay about one-half way between bay and ocean, 1/4 mile north-northeast of "Convent Water Tower" and 1/2 mile south of Collier Islands. (See progress map.)

Immediate locality.—Observed station is on sand and grass beach land about 3 feet above high water, about 65 yards west of top of sand dunes, 8 yards north of a high-water overflow, and 42 yards west of line of telephone poles.

Marks.—Observed station is center point of triangle on standard cement monument buried with top 4 inches below surface of sand.

References.—

	°	'	"	
"Thorofare" (N 71° 43' W).....	0	00	00	1 1/4 miles.
Right tangent of Dog and Bitch islands.....	22	33	--	3/8 mile.
Left tangent of Collier Islands.....	46	12	--	1/2 mile.
Isle of Wight Life-Saving Station.....	86	55	--	3 3/4 miles.
Eighth telephone pole north of convent.....	137	40	10	50 yards.
Seventh telephone pole north of convent.....	233	01	40	65 yards.
Convent chimney.....	263	35	--	1/4 mile.
"Convent Water Tower".....	268	53	30	1/4 mile.
Episcopal Church spire.....	271	19	30	1 mile.
Flagstaff on Atlantic Hotel.....	272	04	--	1 1/2 miles.
Power-house chimney.....	272	55	--	1 1/2 miles.
"Ocean City Water Tower".....	274	05	--	1 3/8 miles.
Ice-plant stacks.....	275	36	--	1 3/4 miles.
Left tangent of water tank at Ocean City bridge.....	281	53	--	1 5/8 miles.
Between chimneys on Tabor house on Tabor Hill.....	288	06	--	1 5/8 miles.
Chimney of "Thorofare Farm" house.....	345	11	--	1 1/4 miles.

CONVENT WATER TOWER.

General locality.—Between Sinepuxent Bay and Atlantic Ocean, about 1 mile north-northeast of "Ocean City Water Tower." (See progress map.)

Immediate locality.—Observed station is on a large wooden water-tower structure belonging to the Convent of Saint Rose, at Ocean City. This tower is detached from the main building and is a very prominent object.

Marks.—Observed station is center point of top part of water-tank structure.

References.—None necessary.

GANTT.

General locality.—Western shore of Sinepuxent Bay, opposite Ocean City and about 1/2 mile back from the water. (See progress map.)

Immediate locality.—Observed station is in cultivated field on Gantt (formerly Davis) farm, and is about 10 feet above high water. It is about 300 yards north by west of the old Davis farmhouse, on a ridge or slight rise of ground making out from woods, 260 yards east-southeast of old woods and 90 yards east of a young growth of pines adjacent to old woods. It is also about 70 yards north of east-and-west wire fence and ditch and 83 yards west of a north-and-south fence and road running to farmhouse. Cement monument marking reference station is 85.44 meters S 89° 48' W of station in the edge of young growth of pines.

Marks.—Observed station is center point of triangle on standard cement monument buried with top 2 feet below the surface of the ground. Reference station is center point of triangle on standard cement monument with top about 4 inches above the ground.

References.—

	°	'	"	
"Harmon" (S 4° 38' W).....	0	00	00	1 mile.
REFERENCE STATION.....	85	10	30	85.44 meters.
East tip of barn roof.....	195	45	--	3/4 mile.
Chimney of "Thorofare Farm" house.....	206	10	--	3/4 mile.
Middle chimney of Convent.....	259	40	--	1 1/2 miles.
Episcopal Church spire.....	286	35	30	1 1/4 miles.
Catholic Church cross.....	300	49	--	1 1/4 miles.
"Ocean City Water Tower".....	303	30	--	1 1/4 miles.
Power-house chimney.....	304	19	--	1 1/4 miles.
Flagstaff on square roof of Atlantic Hotel.....	304	45	--	1 1/4 miles.
Ice-plant stack.....	316	53	--	1 1/4 miles.
Left chimney of house on Tabor Hill.....	320	28	--	1 mile.
Near chimney on house on Tabor farm.....	359	31	--	3/4 mile.

HAMILTON.

General locality.—Eastern shore of Sinepuxent Bay, in Ocean City, about $\frac{1}{2}$ mile northeast of the railway bridge and two-thirds the way from Sinepuxent Bay to the board walk on the ocean side. (See progress map.)

Immediate locality.—Observed station is on sand and grass land about 6 yards east-southeast of the extension of the east curb line of Philadelphia avenue, 145 yards northwest of Episcopal Church spire, 16 yards east-southeast of the telephone line edge of wagon trail along proposed Philadelphia avenue, and 40 yards north of an exposed line of sewer pipe.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Harmon" (S 66° 20' W).....	0	00	00	1 $\frac{1}{4}$ miles.
Chimney of house on Thorofare Farm.....	73	11		1 $\frac{1}{2}$ miles.
Right tangent of Drum Point.....	91	14		1 mile.
Left tangent of island.....	110	31		$\frac{3}{4}$ mile.
"Convent Water Tower".....	140	43		$\frac{3}{4}$ mile.
South end of roof of Quillin's cottage.....	183	33		400 yards.
Peak on tower of Doyle cottage.....	198	09		350 yards.
Chimney of Mervue cottage.....	226	40		350 yards.
Chimney of Hotel Hamilton.....	229	53		225 yards.
Episcopal Church spire.....	241	44		145 yards.
Chimney on Atkins cottage.....	275	50		175 yards.
Flagstaff on left end of Mount Pleasant Hotel..	287	36		$\frac{1}{4}$ mile.
Presbyterian Church spire.....	305	42	50	$\frac{1}{4}$ mile.
Power-house chimney.....	308	56		$\frac{1}{4}$ mile.
"Ocean City Water Tower".....	312	31		$\frac{1}{2}$ mile.
Between two chimneys on Tabor house.....	347	40		1 mile.
Left chimney of Gray's house.....	357	14		1 $\frac{1}{4}$ miles.

OCEAN CITY WATER TOWER.

General locality.—Between Atlantic Ocean and Sinepuxent Bay, in Ocean City, Md. (See Chart No. 13.)

Immediate locality.—Observed station is located about 80 yards north by east of Ocean City railroad station, 30 yards south by west from curb of Talbot street, and 60 yards west by north from curb of Baltimore avenue. It is on a steel structure 100 feet high, supporting a large round water tank 25 feet deep, which is known as "Ocean City Water Tower."

Marks.—Observed station is center point of upper end of standpipe.

References.—None necessary.

HARMON.

General locality.—West shore of Sinepuxent Bay, about $\frac{3}{4}$ mile back from west end of railroad bridge and just south of the B. C. & A. railway tracks. (See Chart No. 13.)

Immediate locality.—Observed station is about 170 yards east of the first pine woods from the bay shore and about 145 yards east of some young growth pines adjacent to the woods. It is in a field about 72 yards south of the east and west railway tracks and about 65 yards south of the railway fence.

Marks.—Observed station is center point of triangle on standard cement monument buried with top about 12 inches below the surface of the ground.

References.—

	°	'	"	
"Gantt" (N 4° 38' E).....	0	00	00	1 mile.
Near chimney of Harmon house.....	1	46		$\frac{1}{4}$ mile.
"Convent Water Tower".....	48	59	30	1 $\frac{3}{4}$ miles.
Convent high chimney (not ventilator).....	49	51		1 $\frac{3}{4}$ miles.
Episcopal Church spire.....	64	27		1 $\frac{1}{4}$ miles.
Presbyterian Church spire.....	71	26		1 $\frac{1}{4}$ miles.
Right chimney of Tabor house..	75			$\frac{3}{4}$ mile.

	°	'	"	
"Ocean City Water Tower"	77	04	10	1 $\frac{1}{8}$ miles.
Power-house chimney	79	01	--	1 mile.
Flagstaff on square roof of Atlantic Hotel.....	80	18	--	1 mile.
Cropper's ice-plant stacks.....	92	31	--	1 mile.
Corner of fence and woods.....	218	--	--	242 yards.
Corner of railroad fence and woods.....	291	--	--	138 yards.
3 or 4 small trees.....	126	--	--	$\frac{1}{8}$ mile.
Left clump of trees.....	157	--	--	$\frac{1}{8}$ mile.

OCEAN.

General locality.—Eastern shore of Sinepuxent Bay, about one-third way from bay to ocean and about $\frac{3}{8}$ mile south-southwest of "Ocean City Water Tower." (See Chart No. 13.)

Immediate locality.—Observed station is on sand and grass land about 8 yards east of telephone line and about 2 yards west of an old line of poles formerly used to support wires. It is apparently in proposed extension of Philadelphia avenue, but this is uncertain, as the street lines are indefinite in this locality.

Marks.—Observed station is center point of triangle on standard cement monument buried with top 12 inches below surface of sand.

References.—

	°	'	"	
"Buffing" (S 64° 10' W).....	0	00	00	1 $\frac{1}{4}$ miles.
Near corner of ice house sill.....	16	51	--	110 yards.
Left chimney on Harmon house.....	49	32	--	1 mile.
Left chimney of Tabor house.....	78	45	--	$\frac{3}{4}$ mile.
Left stack of Cropper's ice plant.....	127	19	--	170 yards.
Left tangent of Captain Ludlam's office.....	133	04	--	165 yards.
Near chimney on Ocean City station.....	140	10	--	$\frac{3}{8}$ mile.
"Ocean City Water Tower".....	141	52	--	$\frac{3}{8}$ mile.
Power-house chimney.....	146	17	--	$\frac{3}{8}$ mile.
Flagstaff on Atlantic Hotel.....	149	50	--	$\frac{3}{8}$ mile.
Chimney of 2 $\frac{1}{2}$ -story house.....	162	49	--	200 yards.
Near corner of house.....	181	58	--	200 yards.
Near corner of T. Cropper house.....	254	08	--	33 yards.
Chimney of white house.....	311	45	--	200 yards.
Near corner of Baker house.....	352	22	--	1 $\frac{3}{4}$ miles.
Baker windmill.....	353	18	--	1 $\frac{3}{4}$ miles.
Chimney of Buffington house.....	358	13	--	1 $\frac{1}{4}$ miles.
"Buffington Windmill".....	358	35	--	1 $\frac{3}{8}$ miles.

BUFFING.

General locality.—Western shore of Sinepuxent Bay, on lowland about 200 yards northeast of knoll known locally as "Steam Mill Hill" and about 1 $\frac{1}{2}$ miles southwest of Ocean City. (See Chart No. 13.)

Immediate locality.—Observed station is on sand and loam land about 2 feet above high water, 25 yards west from shore, 65 yards northwest of where wire fence meets shore, 30 yards northeast of nearest point of fence, and 60 yards from junction of fence and pine woods.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Harmon" (N 13° 19' E).....	0	00	00	$\frac{7}{8}$ mile.
"Convent Water Tower".....	29	02	--	2 $\frac{5}{8}$ miles.
Between chimneys on Tabor house on Tabor Hill.....	30	34	--	1 $\frac{1}{4}$ miles.
Episcopal Church spire.....	36	31	--	2 miles.
Middle of Ocean City Life-Saving Station tower.....	41	35	--	2 miles.
"Ocean City Water Tower".....	41	21	--	1 $\frac{1}{2}$ miles.

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	°	'	"	
Power-house chimney.....	42	47	--	1½ miles.
Flagstaff on square roof of Atlantic Hotel.....	43	48	--	1½ miles.
Cropper's ice-plant stacks.....	47	19	--	1¼ miles.
Left end of fence at shore.....	155	01	--	65 yards.
Left chimney of Kelley brown house.....	187	03	--	1 mile.
Chimney at right end of roof of Buffington house.....	207	50	--	200 yards.
"Buffington Windmill".....	213	28	--	200 yards.
Fence and woods.....	272	51	--	60 yards.
Chimney on top of hip roof of house.....	311	14	--	½ mile.
Right tangent of woods.....	311	14	--	60 yards.
Middle of convent roof.....	29	53	--	2⅝ miles.

BUFFINGTON WINDMILL.

General locality.—Western shore of Sinepuxent Bay, on knoll known locally as "Steam Mill Hill" and about 1½ miles southwest of Ocean City. (See Chart No. 13.)

Immediate locality.—Near house belonging to Mr. Buffington.

Marks.—Observed station is center of windmill tower.

References.—None necessary.

GULL.

General locality.—Eastern shore of Sinepuxent Bay nearly halfway between bay and ocean and about 1 mile south-southwest of Ocean City. (See Chart No. 13.)

Immediate locality.—Observed station is on sand and grass beach land about 2 feet above high water, 130 yards west of Life-Saving Service telephone line, 200 yards west of top of sand dunes and 65 yards south of a square marble pillar projecting above ground in middle of a bare washed space. Cement monument marking reference station is 7.68 meters S 88° 58' W of observed station and about on line with left end of woods below Buffington farmhouse.

Marks.—Observed station is nail in stub flush with sand and grass. Reference station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Buffing" (N 67° 04' W).....	0	00	00	¾ mile.
Right end of barn roof.....	9	19	--	1½ miles.
Chimney on near side of roof of gray house.....	12	07	--	1½ miles.
Near chimney of Harmon house.....	45	13	--	1¼ miles.
Near chimney of Gantt farm house.....	55	33	--	2½ miles.
Near chimney of gray house.....	64	44	--	3 miles.
Near end of roof of Tabor house on Tabor Hill.....	74	42	--	1 mile.
Left tangent of water tank on left end of Ocean City bridge.....	82	54	--	1⅛ miles.
Between stacks of Cropper's ice plant.....	92	21	--	1 mile.
"Ocean City Water Tower".....	93	34	--	1¼ miles.
Power-house chimney.....	94	54	--	1⅜ miles.
Flagstaff on square roof of Atlantic Hotel.....	95	54	--	1¼ miles.
Near chimney of Kelley house.....	304	04	--	1¼ miles.
Left chimney on Baker house.....	329	05	--	1⅝ miles.
Baker windmill.....	330	14	--	1 mile.
REFERENCE STATION.....	336	01	30	7.685 meters.
Chimney on Buffington house.....	352	42	--	¾ mile.

INKQUILL.

General locality.—Western shore of Sinepuxent Bay, near Coffins Point, about 2⅜ miles south-west of Ocean City. (See Chart No. 13.)

Immediate locality.—Observed station is on top of a shell knoll about 10 feet above high-water mark, 30 yards west of shore, 100 yards from corner of fence near Kelley house, 150 yards from near corner of Kelley house, and about 55 yards southeast of a ditch.

Marks.—Observed station is center point of triangle on standard cement monument buried with top 12 inches below surface of ground.

References.—

	°	'	"	
"Buffing" (N 20° 01' E).....	0	00	00	1 mile.
Near end of roof on Tabor house on Tabor Hill.....	13	27		2 ¹ / ₈ miles.
"Convent Water Tower".....	16	19		3 ¹ / ₂ miles.
Between two chimneys on middle of convent roof.....	16	58		3 ¹ / ₃ miles.
Church spire.....	20	05		2 ³ / ₄ miles.
"Ocean City Water Tower".....	21	46		2 ³ / ₈ miles.
Power-house chimney.....	22	38		2 ³ / ₈ miles.
Flagstaff on square roof of Atlantic Hotel.....	23	15		2 ³ / ₈ miles.
Cropper's ice-plant stacks.....	23	32		2 miles.
Tangent of land.....	25	38		170 yards.
Tangent of land.....	89	52		40-50 yards.
Left tangent of fence.....	156	40		125 yards.
Corner of fence.....	178	05		100 yards.
Near chimney of Kelley house.....	184	04		150 yards.
Chimney of gray house.....	203	23		3 miles.
Chimney of large four-sided roof.....	215	03		1 ¹ / ₂ miles.
Baker windmill.....	331	42		1 ¹ / ₂ mile.
"Buffington Windmill".....	356	42		3 ¹ / ₄ mile.
Chimney of Buffington house.....	357	27		3 ¹ / ₄ mile.

SEASIDE.

General locality.—Eastern shore of Sinepuxent Bay, about halfway between bay and ocean and about 2¹/₄ miles south-southwest of Ocean City. (See Chart No. 13.)

Immediate locality.—Observed station is on sand and grass land about 4 feet above high water. It is on the north side of an overflow from the ocean, about 200 yards from Sinepuxent Bay and 120 yards west-northwest of sand dunes between the ocean and the station. Cement monument marking reference station is 10.32 meters N 52° 39' E of observed station. No other permanent reference objects near station.

Marks.—Observed station is nail in stub flush with ground. Reference station is center point of triangle on standard cement monument with top 4 inches above ground.

References.—

	°	'	"	
"Inkquill" N 66° 35' W).....	0	00	00	3 ¹ / ₄ mile.
Baker house.....	22			1 mile.
Chimney on Buffington house.....	43	56		1 ¹ / ₄ miles.
Tabor house on Tabor Hill.....	78	35		2 miles.
"Ocean City Water Tower".....	89	18		2 ¹ / ₄ miles.
Power-house chimney.....	90	01		2 ¹ / ₄ miles.
Flagstaff on square roof of Atlantic Hotel.....	90	35		2 ¹ / ₄ miles.
Telephone pole.....	106	40	10	81.4 meters.
REFERENCE STATION.....	109	14	20	10.32 meters.
Telephone pole.....	141	07	00	39.5 meters.
Telephone pole.....	217	51	10	47.8 meters.
Right chimney of Coffin Hotel.....	321	47		2 miles.
Right chimney of Kelley brown house.....	353	40		3 ¹ / ₄ mile.

ELLPOW.

General locality.—Western shore of Sinepuxent Bay, about $\frac{1}{4}$ mile inland from what is known locally as Powell Point and about $3\frac{1}{2}$ miles southwest of Ocean City. (See Chart No. 13.)

Immediate locality.—Observed station is on marshy grass land well back from bay, near a property line indicated by crab apple trees and a wire fence which runs from bay to crab apple trees and joins a snake fence. It is about $\frac{1}{4}$ mile southeast of Hastings house, about $\frac{1}{4}$ mile southwest of Kelley house, and about $\frac{1}{4}$ mile northeast of Coffin Hotel (a large, unpainted, square house with four-sided roof). Cement monument marking reference station is 7.20 meters S $83^{\circ} 50'$ W of observed station.

Marks.—Observed station is nail in pine stub flush with the ground. Reference station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Fassett" (S $10^{\circ} 32'$ W).....	0	00	00	$1\frac{1}{4}$ miles.
"North Beach Life-Saving Station".....	0	10	30	$6\frac{5}{8}$ miles.
Chimney of Henry brick house.....	9	48	--	$1\frac{7}{8}$ miles.
Chimney on right side of four-sided roof of Coffin Hotel.....	59	46	--	$\frac{1}{4}$ mile.
REFERENCE STATION.....	73	18	00	7.20 meters.
Chimney on left end of roof of Hastings house.....	133	16	--	$\frac{1}{4}$ mile.
Baker windmill.....	203	41	--	$1\frac{3}{8}$ miles.
Center of roof of Baker house.....	205	02	--	$1\frac{3}{8}$ miles.
"Buffington Windmill".....	205	39	--	$1\frac{7}{8}$ miles.
Chimney of Buffington house.....	206	00	--	$1\frac{7}{8}$ miles.
"Ocean City Water Tower".....	214	08	--	$3\frac{1}{2}$ miles.
Power-house chimney.....	214	44	--	$3\frac{1}{2}$ miles.
Flagstaff on square roof of Atlantic Hotel..	215	10	--	$3\frac{1}{2}$ miles.

BEACH.

General locality.—Eastern shore of Sinepuxent Bay, about halfway between bay and ocean and about 3 miles south-southwest of Ocean City. (See Chart No. 13.)

Immediate locality.—Observed station is on sand and grass beach land about 3 feet above high water, 250 yards west of shore of Sinepuxent Bay and 2 feet east of line of telephone poles. Cement monument marking reference station is 6.40 meters N $0^{\circ} 23'$ E of observed station. No other permanent reference objects near station.

Marks.—Observed station is center point of triangle on standard cement monument. Reference station is center point of triangle on standard cement monument. (NOTE.—Reported lost in shifting sand at date of publication.)

References.—

	°	'	"	
"Inkquill" (N $22^{\circ} 59'$ W).....	0	00	00	$1\frac{1}{8}$ miles.
Cupola on Baker house.....	3	15	--	$1\frac{1}{2}$ miles.
Baker windmill.....	4	14	--	$1\frac{1}{2}$ miles.
Nearest chimney on Baker house.....	5	07	--	$1\frac{1}{2}$ miles.
Cupola on Buffington barn.....	15	20	--	$1\frac{7}{8}$ miles.
"Buffington Windmill".....	16	41	--	$1\frac{7}{8}$ miles.
Chimney on left end of roof of Buffington house.....	17	00	--	$1\frac{7}{8}$ miles.
REFERENCE STATION.....	23	21	50	6.40 meters.
Between two chimneys on Harmon house.....	24	21	--	$2\frac{7}{8}$ miles.
Tabor house on Tabor Hill.....	37	08	--	$2\frac{7}{8}$ miles.
Cropper's ice-plant stacks.....	44	00	--	$2\frac{3}{4}$ miles.
"Ocean City Water Tower".....	44	58	--	3 miles.
Flagstaff on square roof of Atlantic Hotel..	45	54	--	3 miles.
Point of four-sided roof.....	249	21	--	$3\frac{3}{8}$ miles.

	°	'	"	
"Longwells Windmill".....	249	45	--	3 $\frac{3}{8}$ miles.
Chimney on near end of Henry brick house ..	287	40	--	2 miles.
Left tangent of Coffin Hotel.....	301	13	--	2 miles.
Right chimney of large white house.....	315	37	--	2 miles.
Left chimney on Kelley brown house.....	356	21	--	1 $\frac{1}{8}$ miles.

FASSETT.

General locality.—Western shore of Sinepuxent Bay about $\frac{1}{2}$ mile north-northeast of Fassett Point. (See Chart No. 13.)

Immediate locality.—Observed station is on shell and marsh land about 2 feet above high water, 120 yards south by east from slough making into marsh, about 140 yards west of side of point, and 110 yards north of side of point. It is about 200 yards northeast of a fence with a clump of trees beyond it.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"North Beach Life-Saving Station" (S 10° 43' W).....	0	00	00	5 $\frac{1}{2}$ miles.
Tangent of point.....	7	45	--	300 yards.
"Nellys".....	13	56	40	$\frac{3}{4}$ mile.
Left of clump of trees.....	21	33	--	500 yards.
Right edge of clump of trees.....	51	20	--	400 yards.
Chimney on gray house.....	89	05	--	$\frac{5}{8}$ mile.
Right tangent of roof of brick house.....	133	15	--	$\frac{3}{4}$ mile.
Chimney on center of red roof on white house..	141	26	--	$\frac{3}{4}$ mile.
Chimney on left side of a French roof house..	165	10	--	2 miles.
Slough.....	167	--	--	120 yards.
Baker windmill.....	192	36	--	2 $\frac{1}{2}$ miles.
Chimney on right edge of Baker house.....	193	24	--	2 $\frac{1}{2}$ miles.
"Buffington Windmill".....	195	27	--	3 miles.
Between chimneys on Tabor house near Ocean City bridge.....	200	53	--	4 $\frac{1}{2}$ miles.
"Ocean City Water Tower".....	205	23	--	4 $\frac{5}{8}$ miles.
"Convent Water Tower".....	203	05	--	5 miles.
Power-house chimney.....	205	49	--	5 miles.
Flag pole on square roof of Atlantic Hotel....	206	08	--	4 $\frac{5}{8}$ miles.

SHORE.

General locality.—Eastern shore of Sinepuxent Bay, about halfway between the bay and the ocean and about 4 $\frac{1}{4}$ miles south-southwest of Ocean City. (See Chart No. 13.)

Immediate locality.—Observed station is on sand and grass beach land about 2 feet above high water and 16 yards east of line of Life-Saving Service telephone line poles. Cement monument marking reference station is 6.78 meters N 72° 59' E of observed station. No other permanent objects near station.

Marks.—Observed station is nail in stub about 3 inches above sand. Reference station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Ellpow" N 29° 35' W).....	0	00	00	1 $\frac{3}{4}$ miles.
Chimney of gray house.....	21	19	--	2 $\frac{1}{4}$ miles.
Baker windmill.....	28	55	--	2 $\frac{5}{8}$ miles.
Left chimney of Kelley brown house.....	29	32	--	2 miles.
Baker house beyond.....	29	33	--	2 $\frac{1}{2}$ miles.
"Buffington Windmill".....	34	59	--	3 miles.
Buffington house chimney.....	35	11	--	3 miles.

	°	'	"	
Chimney of Tabor house on Tabor Hill.....	46	35	--	4 $\frac{1}{8}$ miles.
"Ocean City Water Tower".....	52	06	--	4 $\frac{1}{4}$ miles.
Power-house chimney.....	52	29	--	4 $\frac{1}{4}$ miles.
REFERENCE STATION.....	102	33	45	6.78 meters.
Top point of large four-sided roof.....	267	58	--	2 $\frac{1}{2}$ miles.
"Longwells Windmill".....	268	30	--	2 $\frac{1}{4}$ miles.
Large chimney on house in woods.....	278	02	--	2 $\frac{1}{8}$ miles.
Left chimney of Henry house.....	287	35	--	1 $\frac{1}{2}$ miles.
Left chimney of brick house.....	330	41	--	2 miles.
Chimney on left end of gray house.....	340	06	--	2 miles.
Left chimney of Coffin Hotel.....	349	42	--	1 $\frac{3}{4}$ miles.

NELLYS.

General locality.—Western shore of Sinepuxent Bay, about 1 $\frac{1}{4}$ miles north of Sandy Point on a point of land near place called Nellys Bar. See Chart No. 13.)

Immediate locality.—Observed station is about 5 feet above high water, 45 yards west-northwest of extreme end of point, 25 yards from north side of point and 20 yards from south side of point. It is on the edge of a cultivated field and about $\frac{1}{4}$ mile southeast of a large old-fashioned 2 $\frac{1}{2}$ -story brick house.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Fassett" N 24° 40' E).....	0	00	00	3 $\frac{1}{4}$ mile.
"Buffington Windmill".....	1	11	30	4 miles.
Chimney of Buffington house.....	1	22	--	4 miles.
Between two chimneys on Kelley house.....	3	54	--	2 $\frac{7}{8}$ miles.
Near end of roof of Tabor house.....	5	51	--	5 miles.
"Convent Water Tower".....	8	00	--	6 $\frac{1}{2}$ miles.
Middle of convent.....	8	21	--	6 $\frac{1}{2}$ miles.
Church spire.....	9	24	--	6 miles.
Church spire.....	9	36	--	6 miles.
"Ocean City Water Tower".....	9	43	--	6 miles.
Power-house chimney.....	10	05	--	6 miles.
Middle of square roof of Atlantic Hotel.....	10	22	--	6 miles.
"North Beach Life-Saving Station".....	163	40	40	4 $\frac{5}{8}$ miles.
Tangent of Sandy Point.....	174	02	--	1 $\frac{1}{4}$ miles.
Weather vane on Longwell house.....	192	40	--	1 mile.
"Longwells Windmill".....	194	06	--	1 mile.
Left chimney of Henry brick house.....	300	02	--	1 $\frac{1}{4}$ mile.

BAR.

General locality.—Eastern shore of Sinepuxent Bay, about halfway between bay and ocean and about 5 $\frac{1}{4}$ miles south-southwest of Ocean City. (See Chart No. 13.)

Immediate locality.—Observed station is on sand and grass beach land about 3 feet above high water, 110 yards west of top of sand dunes, and 5 yards east of line of Life-Saving Service telephone poles. There are no permanent objects near the station.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Nellys" (N 66° 14' W).....	0	00	00	1 $\frac{1}{8}$ miles.
Southerly chimney of Henry brick house.....	4	33	--	1 $\frac{1}{4}$ miles.
Chimney on northerly end of roof with two gable windows.....	34	33	--	2 miles.
Chimney on middle of red roofed white house..	37	42	--	2 $\frac{3}{8}$ miles.
Left chimney of large white house.....	39	27	--	2 $\frac{3}{8}$ miles.

Chimney on southerly corner of four-sided roof	°	'	"	
of gray house	48	20	--	2½ miles.
Baker windmill	72	16	--	3½ miles.
"Buffington Windmill"	76	16	--	3¾ miles.
Buffington house chimney	76	25	--	3¾ miles.
"Ocean City Water Tower"	89	05	--	5¼ miles.
Power-house chimney	89	24	--	5¼ miles.
Telephone pole	80	28	--	32 yards.
Telephone pole	275	45	--	65 yards.
Middle of roof of Longwell house	324	48	--	1½ miles.

LONGWELLS WINDMILL.

General locality.—Western side of Sinepuxent Bay, about ½ mile north by west from Sandy Point. (See Chart No. 13.)

Immediate locality.—Observed station is on tower in rear of house on "Longwell Farm."

Marks.—Observed station is center of windmill.

References.—None necessary.

SANPOL.

General locality.—Western shore of Sinepuxent Bay, on Sandy Point. (See Chart No. 13.)

Immediate locality.—Observed station is on sage land 2 feet above high-water mark, about 80 yards west of extreme end of point, which is well rounded, 40 yards north of one shore of the point and 110 yards south of the other shore of the point. It is about 25 yards east-southeast of one end of a grove of crab-apple trees and about 110 yards south of the other end. Small bushes about 18 inches high surround station.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"North Beach Life-Saving Station" (S 3° 33' W)	0	00	00	3¾ miles.
North Beach Life-Saving Station flagstaff	0	15	--	3¾ miles.
Tangent to "Indian Graveyard Point"	36	44	--	1 mile.
Crab-apple tree	64	--	--	70 yards.
Southerly chimney of stone house	70	15	--	½ mile.
Left end of grove of crab-apple trees	118	--	--	25 yards.
Dark brown house	191	--	--	1½ miles.
"Ocean City Water Tower"	208	10	--	6¼ miles.
Chimney on Baker barn	199	19	--	4¾ miles.
Chimney on Baker house	199	41	--	4¾ miles.
Tabor house near Ocean City bridge	204	58	--	6¾ miles.

MUD.

General locality.—Eastern shore of lower Sinepuxent Bay, about two-thirds way from bay to ocean and 1 mile east-southeast of Sandy Point. (See Chart No. 13.)

Immediate locality.—Observed station is on sandy ground about 3 feet above high water, 60 yards west-northwest from top of a sand dune, 100 yards east of head of a small, narrow inlet from Sinepuxent Bay, and 110 yards east-southeast of a line of Life-Saving Service telephone poles which pass about 18 yards to the east of the wagon trail. Cement monument marking reference station is 18.84 meters N 57° 54' W of observed station. No other permanent reference objects near station.

Marks.—Observed station is a nail in a stub flush with the sand. Reference station is center point of triangle on standard cement monument.

References.—

"North Beach Life-Saving Station" (S. 21°	°	'	"	
39' W)	0	00	00	3¼ miles.
Telephone pole	49	01	--	150 yards.
Southerly chimney of storehouse	78	50	--	1½ miles.

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	°	'	"	
Telephone pole.....	83	07		110 yards.
REFERENCE STATION.....	100	26	50	18.84 meters.
Northerly end of ridge of roof of large barn.....	104	09		1¾ miles.
"Longwells Windmill".....	108	26		1½ miles.
Top point of four-sided roof.....	108	27		1⅝ miles.
Chimney on southerly end of long building.....	119	05		1¾ miles.
Telephone pole.....	120	29		125 yards.
Near chimney of brick house.....	139	44		2 miles.
"Ocean City Water Tower".....	180	56	20	6½ miles.

INGRAYA.

General locality.—Western shore of Sinepuxent Bay, on easterly side of Sinepuxent Neck, on point known locally as Indian Graveyard. (See Chart No. 13.)

Immediate locality.—Observed station is about 5 feet above high water, 55 yards north of nearest shore, 180 yards west of extreme end of point near bushes, and 80 yards east of where a ditch coming from the northward turns to westward. Two trees, each about 75 yards distant, are located on the line of the ditch.

Marks.—Observed station is center point of triangle on standard cement monument buried with top 14 inches below surface of ground.

References.—

"North Beach Life-Saving Station" (S 12° 25'	°	'	"	
E).....	0	00	00	2¾ miles.
Tangent to Green Point.....	42	19		½ mile.
Corner of ditch.....	109	10		80 yards.
Tree, 8 inches diameter.....	118	20		75 yards.
Tree, 8 inches diameter.....	162	24		80 yards.
Near chimney of 2½-story house (Hawks Nest).....	216	54		¾ mile.
"Longwells Windmill".....	219	50		1½ miles.
Tangent of Sandy Point.....	239	43		1¼ miles.
Bushes to east of end of point.....	299			180 yards.

SALT.

General locality.—Eastern shore of lower Sinepuxent Bay, about two-thirds way from bay to ocean and 1½ miles south-southeast of Sandy Point. (See Chart No. 13.)

Immediate locality.—Observed station is on sand and marsh beach land about 3 feet above high water, 105 yards east by south of line of poles of Life-Saving Service telephone line, and 175 yards east of a small creek known as "Jones Salt Works Drain." No permanent objects near station.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

"North Beach Life-Saving Station" S 20°	°	'	"	
36' W).....	0	00	00	2 miles.
North Beach Life-Saving Station flagstaff.....	0	14	20	2 miles.
Telephone pole.....	50	36		175 yards.
Telephone pole.....	72	36		135 yards.
Jones Salt Works Drain.....	80			175 yards.
Telephone pole.....	111	48		135 yards.
Left chimney of stone house.....	121	44		1¾ miles.
Telephone pole.....	137	07		200 yards.
"Longwells Windmill".....	141	23		2 miles.
Center of roof of white house.....	141	44		2½ miles.
Near chimney of 2½-story house.....	150	21		4½ miles.
"Ocean City Water Tower".....	182	07	40	7¾ miles.

NORTH BEACH LIFE-SAVING STATION.

General locality.—Atlantic coast side of strip of beach land between lower Sinepuxent Bay and the ocean. (See Charts Nos. 13 and 14.)

Immediate locality.—Observed station is on lookout cupola on the North Beach Life-Saving Station. This cupola is a gable-roof structure on a gable-roof 2½-story house.

Marks.—Observed station is a black and white 4 by 4 inch pole secured temporarily to the exact middle of ridge of gable roof of lookout cupola.

References.—None necessary.

BIRCH.

General locality.—Southern part of Sinepuxent Neck, between Sinepuxent Bay and Newport Bay, about ½ mile north-northwest of South Point. (See Charts Nos. 13 and 14.)

Immediate locality.—Observed station is on the northwest and higher of two knolls about 20 feet above high-water mark, 600 yards east of Island Point, 200 yards northeast of shore of upper Chincoteague Bay, 75 yards east-southeast of where a ditch and fence meet, and about 400 yards southwest of a house and barn.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	o	'	"	
"Guilberts Cupola" (S 48° 09' W)-----	0	00	00	6¾ miles.
Chimney on left of a small house-----	12	13	--	4¾ miles.
Nail in blaze in walnut tree (20 inches diameter)-----	25	14	--	28.61 meters.
Chimney on black roof of white house-----	28	46	--	4¼ miles.
"Handys Hammock"-----	34	41	30	3 miles.
Cedar tree-----	41	39	--	80 yards.
Jones windmill-----	47	27	--	3½ miles.
Nail in blaze in walnut tree-----	66	33	40	25.52 meters.
Chimney of house near "Newport"-----	83	50	--	2½ miles.
Holly tree-----	156	57	--	150 yards.
Cedar tree near Birch farm buildings-----	184	58	--	300 yards.
Chimney of Birch farm house-----	192	32	--	300 yards.
Cedar tree-----	229	57	--	195 yards.
Chimney of hotel near "North Beach Life-Saving Station"-----	259	49	--	2½ miles.
Nail in blaze in walnut tree-----	341	34	--	12.72 meters.

NECK.

General locality.—Northeastern shore of Newport Bay, on easterly side of Newport Neck between Greys Inlet and Spence Cove. (See Chart No. 13.)

Immediate locality.—Observed station is on marsh land about 400 yards northeast of Knot Point, 100 yards north from shore of Spence Cove, 50 yards northwest of small marsh inlet, and 10 yards south of edge of a prominent grove of old oaks. There are bushes between the station and the oak grove. Cement monument marking reference station is 12.72 meters N 7° 23' W from observed station.

Marks.—Observed station is center point of triangle on standard cement monument. Reference station is center point of triangle on standard cement monument. (NOTE.—Top disconnected, but re cemented.)

References.—

	o	'	"	
"Handys Hammock" (S 53° 53' W)-----	0	00	00	3 miles.
Tall water bushes-----	17	--	--	75 yards.
House behind bushes-----	17	33	--	4½ miles.
Left chimney of large house-----	29	37	--	2¾ miles.
Chimney of 1½-story white house-----	43	48	--	1½ miles.
Left edge of oak grove-----	81	14	--	25 yards.
Nail in blaze of persimmon tree (3 inches diameter)-----	100	36	50	12.24 meters.

Nail in blaze in oak tree (12 inches diameter)-----	117	35	30	25.28 meters.
REFERENCE STATION-----	118	43	40	12.72 meters.
Nail in blaze in oak tree-----	173	04		17.88 meters.
Chimney of house in woods-----	216	32		$\frac{3}{4}$ mile.
Left chimney of large house-----	277	26		1 mile.
Tangent of marsh-----	253	07		$\frac{1}{4}$ mile.
Right tangent of Island Point-----	304	20		$1\frac{1}{2}$ miles.
Tangent of marsh point-----	334	02		$\frac{1}{4}$ mile.

NEWPORT.

General locality.—Northwestern shore of Newport Bay on easterly side of elevated land known as Cropper Island. (See Chart No. 13.)

Immediate locality.—Observed station is on elevated tilled land about 5 feet above high-water mark, 200 yards west of mouth of marsh creek in bay shore, and 150 yards south of the only house on the island. It is near east edge of tilled land, about 70 yards west from edge of marsh. The tilled and marsh land is separated by a strip of land covered with trees.

Marks.—Observed station is center point of triangle on standard cement monument.

<i>References.</i> —	°	'	"	
"Neck" (S 86° 10' E)-----	0	00	00	$1\frac{1}{2}$ miles.
A house-----	22	42		2 miles.
Chimney of Birchs house-----	32	29		$2\frac{1}{2}$ miles.
Walnut tree (24 inches diameter)-----	83	53		70 yards
Three trees-----	94			150 yards.
Left tangent of point of land-----	115	07		1 mile.
New barn-----	129	06		$2\frac{1}{2}$ miles.
Chimney on house-----	133	39		$1\frac{1}{2}$ miles.
Chimney on left end of house-----	158	30		1 mile.
Thorn bushes-----	171	44		150 yards.
Chimney on house-----	266	57		150 yards.
Double walnut tree-----	297	41		250 yards.
Well sweep-----	214	11		200 yards.

HANDYS HAMMOCK.

General locality.—Western shore of upper end of Chincoteague Bay and western side of entrance to Newport Bay on solid land partly surrounded by marsh known as Handys Hammock. (See Charts Nos. 13 and 14.)

Immediate locality.—Observed station is on a sand knoll about 10 feet above high water and 140 yards west-northwest from the extreme end of the narrow point on which it is situated. It is about 35 yards west of another short point, 30 feet south-southwest of shore at a sand beach, 20 yards north of a thorn bush and 50 yards north-northwest of a small pool 20 feet square.

Marks.—Observed station is center point of triangle on standard cement monument.

<i>References.</i> —	°	'	"	
"North Beach Life-Saving Station" S 82° 13' E)-----	0	00	00	5 miles.
North Beach Life-Saving Station flagstaff-----	00	14		5 miles.
Left edge of woods beyond Kelleys Point-----	106	39		$2\frac{1}{4}$ miles.
Myrtle tree-----	115	42		50 yards.
Chimney on left end of large white house-----	131	57		$1\frac{1}{4}$ miles.
Chimney right end of another large white building-----	136	48		$2\frac{1}{4}$ miles.
Center of large white house-----	146	42		$1\frac{1}{2}$ miles.
Right end of new barn roof-----	178	12		$1\frac{1}{2}$ miles.
Windmill-----	221	42		$\frac{1}{2}$ mile.

	°	'	"	
Chimney of house with two piazzas	224	17	--	1/2 mile.
Chimney of large unpainted house	251	18	--	1 mile.
Middle of clump of 12 persimmon trees	267	35	--	50 yards.
Chimney on near end of large white house	289	48	--	2 1/4 miles.
Tangent to South Point	354	31	--	3 miles.

BEACON CLUMPS.

General locality.—Easterly side of upper Chincoteague Bay, on the southern and larger of the two small marsh islands called Beacon Clumps. (See Chart No. 14.)

Immediate locality.—Observed station is on a small marsh island covered at extreme high water. It is situated about 35 yards south of shore, 22 yards west of shore, 28 yards north of shore, and 75 yards east of shore.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Guilberts Cupola" S 78° 50' E)	0	00	00	4 1/2 miles.
Modern house being constructed	2	58	--	4 1/2 miles.
Silo building	3	18	--	4 1/2 miles.
Chimney of Jones house on Newport Bay	51	50	--	6 1/4 miles.
Near end of roof of house on South Point	86	18	--	5 1/2 miles.
First tree near North Beach Life-Saving Station	103	21	--	5 miles.
North Beach Life-Saving Station flagstaff	111	13	--	5 miles.
"North Beach Life-Saving Station"	111	15	20	5 miles.
Other Beacon Clump	116	--	--	1/4 mile.
Green Run Inlet Life-Saving Station lookout	255	46	--	3 1/2 miles.
Right end of Green Run Inlet woods	271	31	--	3 1/2 miles.
Between two chimneys on cream-colored house	339	--	--	5 1/2 miles.

TURNAGAIN.

General locality.—Eastern shore of Chincoteague Bay, on main land marsh about 1 mile southeast of Whittington Point. (See Charts Nos. 14 and 15.)

Immediate locality.—Observed station is on marsh land awash at high water, about 75 yards south from shore, 55 yards east from shore, and about 83 yards west from shore of a small bay. A creek runs nearly around this piece of marsh, but does not make an island of it. No permanent reference marks near station.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Pope Island Life-Saving Station" (S 15° 22' W)	0	00	00	4 3/4 miles.
Point of land	18	02	--	1/4 mile.
Point of land	34	23	--	2 miles.
Point of marsh	91	11	--	1/8 mile.
Point of land	97	54	--	1/4 mile.
Point of land	164	16	--	3/4 mile.
Point of this marsh	194	28	--	1/8 mile.
Beginning of woods	251	41	--	1 mile.
Cut in top of woods	281	41	--	3/4 mile.
End of woods	313	19	--	1/2 mile.
Sand dune behind woods	330	44	--	1 3/4 miles.
Clump of trees	336	32	--	1 3/4 miles.
Duck blind	355	44	--	1 mile.

GREEN RUN INLET LIFE-SAVING STATION FLAGSTAFF.

General locality.—Atlantic coast, about 18 miles south-southwest of Ocean City and about 15 miles northeast by north of "Assateague Light." (See Charts Nos. 14 and 15.)

Immediate locality.—Observed station is detached flagstaff with a topmast belonging to Green Run Inlet Life-Saving Station.

Marks.—Observed station is center of flagstaff.

References.—None necessary.

LANDLET.

General locality.—Western shore of Chincoteague Bay, about $2\frac{1}{4}$ miles south of Snow Hill Landing, on point of land known locally as Watermelon Point. (See Chart No. 14.)

Immediate locality.—Observed station is on a small sandy island surrounded by marsh land and about 20 yards west of shore. This so-called island is the only hard land on the marsh point and is about $\frac{7}{8}$ mile to the east of the nearest solid land.

Marks.—Observed station is center point of triangle on standard cement monument buried with top 2 inches below surface of ground.

References.—

	°	'	"	
"Guilberts Cupola" (N $7^{\circ} 05'$ E).....	0	00	00	$2\frac{1}{4}$ miles.
Chimney of white house.....	8	02		4 miles.
Right of Green Run woods.....	111	29		5 miles.
"Pope Island Life-Saving Station".....	151	52		$6\frac{3}{4}$ miles.
Four trees on Martin Point.....	185	21		1 mile.
Left of clump of trees called Purnell Hammock.....	197	23		$\frac{3}{4}$ mile.
House.....	217	55		6 miles.
Large tree.....	245	16		$\frac{1}{4}$ mile.
Chimney of white house.....	264	00		$\frac{3}{4}$ mile.
Cedars on property line.....	275	50		$\frac{3}{8}$ mile.
Chimney on middle of house.....	316	13		1 mile.
Chimney outside of house.....	328	08		$1\frac{1}{4}$ miles.
Near end of large barn.....	342	05		$1\frac{1}{4}$ miles.

GUILBERTS CUPOLA.

General locality.—Western shore of Chincoteague Bay, close to Snow Hill Landing. (See Chart No. 14.)

Immediate locality.—Observed station is on a large mansion house located about 100 yards northwest of the land end of Snow Hill Landing.

Marks.—Observed station is center point of top of cupola.

References.—None necessary.

RICKS.

General locality.—Western shore of upper Chincoteague Bay, on point of marsh land about $1\frac{1}{2}$ miles northeast of Snow Hill Landing called Ricks Point. (See Chart No. 14.)

Immediate locality.—Observed station is on a marsh point about 20 yards west from a pool making into marsh, 20 yards south from shore and 90 yards north of shore.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Green Run Inlet Life-Saving Station flagstaff" (S $31^{\circ} 48'$ E).....	0	00	00	$6\frac{1}{4}$ miles.
Green Run Inlet Life-Saving Station cupola.....	0	08	05	$6\frac{1}{4}$ miles.
Right tangent of Green Run woods.....	7	45		7 miles.
Right tangent of pool.....	32	18		20 yards.
Right tangent of Martin Point.....	52	30		$4\frac{1}{2}$ miles.
Center of Purnell Hammock.....	57	22		$4\frac{1}{2}$ miles.
Left tangent of point.....	61	07		$\frac{1}{4}$ mile.
Guilbert windmill.....	83	26		$1\frac{1}{2}$ miles.

	°	'	"	
Chimney near end of house.....	118	37	—	1 mile.
To first of four points of land or line.....	189	54	—	100 yards.
Windmill on red tank.....	195	32	—	2 miles.
Center of thick woods.....	201	09	—	1½ miles.
Right tangent of Kelleys Point.....	231	01	—	2 miles.
North Beach Life-Saving Station flagstaff....	279	42	20	6¼ miles.
Left tangent of pool.....	293	51	—	40 yards.
Left tangent of Robins marsh.....	329	25	—	¾ mile.
"Beacon Clumps".....	332	26	25	3¾ miles.
Mouth of pool.....	340	26	—	30 yards.
Right tangent of Robins marsh.....	349	02	—	¾ mile.

MARYLAND-VIRGINIA LIFE-SAVING STATION BEACH).

General locality.—Atlantic coast near ocean beach, on boundary line between Maryland and Virginia and about ¼ mile north-northeast of Pope Island Life-Saving Station. (See Chart No. 15.)

Immediate locality.—Observed station is on marsh and sand land about 230 yards northwest of high-water mark on beach, 75 yards west of top of sand dunes on inner edge of beach, and about 50 yards northwest of the Life-Saving Service telephone line which runs along the beach in midst of bushes at this point.

Marks.—Observed station is the center of an old granite monument (said to have been established many years ago) which marks the boundary between Maryland and Virginia. Top of monument is 6 by 6 inches square and projects 18 inches above the ground. The top is marked with an east-and-west line from corner to corner and the letters "M" and "V" to indicate the Maryland and Virginia sides of the boundary, respectively.

References.—

	°	'	"	
"Pope Island Life-Saving Station" S 20°	0	00	00	—
12' W).....	0	00	00	— ¼ mile.
Left peak of barn roof.....	5	39	—	— ¼ mile.
"Maryland-Virginia Boundary, Pope Island"....	63	55	—	— ¾ mile.
Chimney on old house on Pope Island.....	68	41	—	— ¾ mile.
Pine tree in cut toward "Mill".....	92	55	—	— ¼ mile.
First telephone pole from end of bushes.....	195	52	—	190 yards.
Fifth telephone pole from end of bushes.....	205	25	—	110 yards.
Sixth telephone pole from end of bushes.....	263	06	—	52 yards.
Seventh telephone pole from end of bushes				
fourth from life-saving station).....	330	58	—	88 yards.
Eighth pole signal pole at life-saving station)....	357	03	—	¼ mile.

MARYLAND-VIRGINIA (POPE ISLAND).

General locality.—Western side of Pope Bay on eastern side of Pope Island, about ¼ mile north-east of its southern extremity and on boundary between Maryland and Virginia. (See Chart No. 15.)

Immediate locality.—Observed station is on hard land 3 feet above high-water mark, about 10 yards west of shore, 85 yards south of an old house, and 10 yards east of bushes.

Marks.—Observed station is the center of an old granite monument projecting 18 inches above ground which marks the boundary between Maryland and Virginia. Top of monument is cut in a square 6 by 6 inches with an east-and-west line from corner to corner and the letters "M" and "V" to indicate the Maryland and Virginia sides of the boundary, respectively.

References.—

	°	'	"	
"Pope Island Life-Saving Station" (S 73° 45' E)....	0	00	00	— ½ mile.
Right tangent of shanty.....	15	32	—	— ¾ mile.
Right tangent of boathouse.....	40	22	—	— ¼ mile.
Center of small island.....	101	—	—	— ¼ mile.
Tangent of Pope Island.....	113	38	—	— ¼ mile.

Survey of Oyster Bars, Worcester County, Md.

	°	'	"	
Two large pines.....	130	07		1 $\frac{1}{4}$ mile.
Left of bushes.....	191	56		10 yards.
Near corner of old house.....	283	08		85 yards.
Point of land near life-saving station wharf.....	336	22		1 $\frac{1}{4}$ mile.
Drill pole near life-saving station.....	355	29		1 $\frac{1}{2}$ mile.

POPE ISLAND LIFE-SAVING STATION (VIRGINIA).

General locality.—Atlantic coast, on Pope Island Beach, about 9 $\frac{3}{4}$ miles northeasterly from "Assateague Light." (See Chart No. 15.)

Immediate locality.—Observed station is on the main building of the Pope Island Life-Saving Station, which is a gable roofed 1 $\frac{1}{2}$ -story wooden structure with a square lookout cupola. Pointed cap piece of cupola supports a weather vane in the form of a fish.

Marks.—Observed station is center of weather-vane spindle.

References.—None necessary.

WILDCAT (VIRGINIA).

General locality.—Northerly end of Chincoteague Island, on westerly side of Assateague Bay. (See Chart No. 15.)

Immediate locality.—Observed station is on marsh land, about $\frac{1}{2}$ mile south of upper end of island, known locally as Wildcat Point. It is inshore about 100 yards northwest of mouth of small marsh drain emptying into Assateague Bay. The marsh creek or drain makes a decided turn about 12 yards south of station.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Assateague Light" (S 26° 06' W).....	0	00	00	5 $\frac{1}{4}$ miles.
Right tangent of woods.....	29	48		1 mile.
"Killick Shoal Light".....	30	37	40	4 $\frac{1}{4}$ miles.
First cedar.....	44	52		1 $\frac{1}{2}$ miles.
Clump of cedars.....	66			1 $\frac{1}{4}$ miles.
A marshy island.....	100			1 $\frac{1}{4}$ miles.
Right tangent of marshy island.....	130	14		1 $\frac{1}{4}$ miles.
Left tangent of Ragged Point.....	172	08		1 mile.
Shanty on Ragged Point.....	176	42		1 mile.
First tree on Ragged Point.....	209	11		1 mile.
Second tree on Ragged Point.....	210	41		1 mile.
Sand dune.....	259			1 mile.
Smith Hammock sand dune.....	323			1 $\frac{1}{4}$ miles.
Middle of boathouse on beach.....	335	52		3 miles.
A marsh tump.....	340			$\frac{3}{4}$ mile.

ASSATEAGUE LIGHT (VIRGINIA).

General locality.—Southerly part of Assateague Island, seacoast of Virginia, about 2 $\frac{1}{2}$ miles from its southwesterly point. (See progress map.)

Immediate locality.—Red tower, 154 feet above sea level and 129 feet above its own base, known as Assateague Light-House.

Marks.—Observed station is center of black lantern.

References.—None necessary.

KILLICK SHOAL LIGHT (VIRGINIA).

General locality.—Southerly end of Chincoteague Bay, on Killick Shoals, off entrance of Chincoteague Channel. (See progress map.)

Immediate locality.—Screw pile structure known as Killick Shoal Light-House.

Marks.—Observed station is center of black lantern.

References.—None necessary.

CHESTER (VIRGINIA).

General locality.—Southern and western shores of Chincoteague Bay, about $\frac{1}{2}$ mile south of shore of bay and $\frac{1}{4}$ mile east of solid land known locally as Mosquito Point Farm. (See progress map.)

Immediate locality.—Observed station is on a mound of dry land surrounded by marsh, known locally as Fox Hill. It is on the highest point and near the apex of the mound, which is V-shaped and about 15 feet above high water at the station. The mound gradually falls off to the level of the marsh from the station to the ends of the V, which are both about 150 yards distant, and at the extreme apex, which is about 25 yards to the north. Reference station is 5.82 meters N $80^{\circ} 51'$ W of the observed station.

Marks.—Observed station is center of tile pipe surrounded by cement with top flush with ground. Reference station is center point of triangle on standard cement monument.

References.—

	o	'	"	
"Assateague Light" (S $59^{\circ} 59'$ E).....	0	00	00	5 $\frac{1}{4}$ miles.
Tower on Wallops Beach Life-Saving Sta- tion	60	44	--	5 $\frac{1}{2}$ miles.
Cupola of barn	135	53	--	$\frac{3}{4}$ mile.
REFERENCE STATION	159	08	10	5.82 meters.
"Grace M. E. Church"	274	27	--	5 $\frac{1}{4}$ miles.
"Killick Shoal Light"	333	30	--	3 $\frac{1}{2}$ miles.
West spire of Union Baptist Church at Chin- coteague	348	15	--	4 miles.

LONG POINT (VIRGINIA).

General locality.—Western shore of lower Chincoteague Bay, near Long Point, about $\frac{1}{2}$ mile east of Franklin City. (See Chart No. 15.)

Immediate locality.—Observed station is on marsh land about 40 yards from end of point of mainland, 30 yards southwest of shore and 20 yards north of shore. A small marsh island is located about 200 yards east of the station, which was once a part of the mainland and known as Long Point. Reference station is 11.81 meters N $42^{\circ} 37'$ W of the observed station.

Marks.—Observed station is center of tile pipe set in cement with top flush with the ground. Reference station is center point of triangle on standard cement monument.

References.—

	o	'	"	
"Mill" (N $38^{\circ} 07'$ E).....	0	00	00	4 miles.
"Assateague Light"	133	26	15	6 $\frac{3}{4}$ miles.
"Killick Shoal Light"	144	32	25	4 $\frac{1}{4}$ miles.
End of wharf at Franklin City	222	33	--	$\frac{1}{2}$ mile.
M. P. Church	252	32	30	1 mile.
Grace M. E. Church (tall spire)	259	07	30	$\frac{3}{4}$ mile.
Grace M. E. Church (short spire)	259	38	35	$\frac{3}{4}$ mile.
REFERENCE STATION	279	16	00	11.81 meters.

GRACE M. E. CHURCH (VIRGINIA).

General locality.—Western shore of lower Chincoteague Bay, about $\frac{1}{2}$ mile northwest of railway wharf at Franklin City. (See Chart No. 15.)

Immediate locality.—Observed station is the taller of two towers on church known as Grace M. E. Church.

Marks.—Observed station is center of pointed tower or spire.

References.—None necessary.

MONEY (VIRGINIA).

General locality.—Western shore of lower Chincoteague Bay, about 1 mile west-northwest of Long Point, on northern edge of town of Greenbackville, and just south of Maryland-Virginia boundary. (See Chart No. 15.)

Immediate locality.—Observed station is about 70 yards northeast of railway on a sandy rise of ground about 15 feet above level of track. It is about 25 yards south of the Maryland-Virginia boundary and 30.43 meters S $38^{\circ} 28'$ E of broken stone boundary monument. At the station, "Assateague Light" shows almost tangent to third house north of Grace M. E. Church.

Marks.—Observed station is center point of triangle on standard cement monument buried with top 30 inches below surface of ground

References.—

	°	'	"	
"Grace M. E. Church" S $21^{\circ} 23'$ E)-----	0	00	00	250 yards.
"Assateague Light"-----	7	46	49	$7\frac{1}{4}$ miles.
M. P. Church-----	65	46	20	$\frac{1}{4}$ mile.
Center chimney on square house-----	117	11	--	100 yards.
"Maryland-Virginia Railroad)" (boundary stone)-----	162	55	26	30.43 meters.
"Long Point"-----	324	45	43	1 mile.
Left chimney of two close together-----	330	48	--	150 yards.
Small tower Greenbackville Church-----	359	00	30	250 yards.

MARYLAND-VIRGINIA (RAILROAD).

General locality.—Western shore of lower Chincoteague Bay, inland about 1 mile west-northwest of Long Point, on boundary line between Maryland and Virginia. (See Chart No. 15.)

Immediate locality.—Observed station is about 80 yards northeast of railroad on a sandy rise of ground about 15 feet above level of track. It is on the edge of an excavation in this sand hill and is likely to be undermined any time by the carting away of sand for building purposes. The standard cement monument marking triangulation station "Money" is buried with its top 30 inches below surface of ground 30.43 meters S $38^{\circ} 28'$ E true from station.

Marks.—Observed station is the center of a square-top granite monument projecting 18 inches above ground which marks the boundary between Maryland and Virginia. Top of monument when visited in December, 1907, was broken loose and resting on the undisturbed part of the stone buried in the ground. This top was cut in a square 6 by 6 inches with an east-and-west line from side to side and the letters "M" and "V" to indicate the Maryland and Virginia side of the boundary, respectively

References.—None observed.

MILL.

General locality.—Western shore of Chincoteague Bay, on the northern part of Mill Island. (See Chart No. 15.)

Immediate locality.—Observed station is the highest point of the island, on a hill about 20 feet above high water which is located about $\frac{1}{2}$ mile southwest of the upper end of the island. It is about 40 yards east by south of an abandoned house and sheds and about $\frac{1}{4}$ mile north of another abandoned house.

Marks.—Observed station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Assateague Light" (S $8^{\circ} 59'$ W)-----	0	00	00	10 miles
Right tangent of Chincoteague Island-----	11	54	--	10 miles.
Knoll on this island-----	15	--	--	$\frac{3}{4}$ mile.
Tree (8 inches diameter)-----	21	46	--	40 yards.
Tree (8 inches diameter)-----	42	20	--	70 yards.
Tree (18 inches diameter)-----	54	27	--	39.30 meters.
Near corner of old house-----	62	43	40	36.88 meters.
Next corner of old house-----	70	28	--	37.64 meters.
Cupola on large house-----	138	25	--	$1\frac{1}{2}$ miles.
Chimneys on white house-----	139	11	--	2 miles.
Near end of large barn-----	186	47	--	$4\frac{1}{2}$ miles.
"Landlet" and right of trees at Purnell Hammock-----	195	10	--	$3\frac{3}{4}$ miles.
Dead tree and 2 cedars-----	213	52	--	$\frac{1}{4}$ mile.

	°	'	"	
Right tangent of Assacorkin Island.....	235	34	--	¾ mile.
Left of "Green Run" woods.....	238	40	--	6¾ miles.
"Pope Island Life-Saving Station".....	286	05	--	4¾ miles.
Left tangent of first building on Ragged Point.....	323	39	--	4½ miles.
Left tangent of Chincoteague Island.....	341	06	--	5 miles.
Chimney of old house.....	349	27	--	¼ mile.

TIZZ.

General locality.—Western side of Chincoteague Bay on Tizzard Island. (See Chart No. 15.)

Immediate locality.—Observed station is on the highest point on the island, about 15 feet above high water, about ¼ mile from extreme southeastern point of island, and about 75 yards north of shore line of island.

Marks.—Observed station is center point of triangle on standard cement monument.

	°	'	"	
"Assateague Light" (S 6° 35' W).....	0	00	00	12 miles.
Right of woods at Chincoteague.....	10	38	--	15 miles
Smoke pipe of shanty.....	18	52	--	3 miles.
Chimney on first house at Stockton.....	23	27	--	3¼ miles.
Church steeple at Franklin City.....	28	23	--	5¼ miles.
Church steeple, Greenbackville.....	30	02	30	5½ miles.
Two chimneys on gambrel roof.....	40	--	--	1¾ miles.
Near chimney of white house.....	101	25	--	2¼ miles.
Near chimney of another white house.....	106	53	--	2¼ miles.
Chimney on large unpainted barn.....	113	07	--	2 miles.
Two chimneys on large house.....	119	19	--	3 miles.
Chimney of yellow building.....	165	59	--	4 miles.
Large white barn.....	199	58	--	4 miles.
Purnell Hammock.....	213	--	--	3¼ miles.
Green Run Inlet Life-Saving Station flagstaff..	256	55	20	7⅞ miles.
"Pope Island Life-Saving Station".....	299	34	50	5¾ miles.
Left tangent Assacorkin Island.....	316	14	--	1⅞ miles.
Left tangent of Mill Island.....	325	17	--	1⅞ miles.
Left of woods at Chincoteague.....	350	52	--	12 miles.

BOUNDARIES OF OYSTER BARS.

EXPLANATION.

The law of the United States authorizing the cooperation of the Department of Commerce and Labor in the survey of natural oyster bars of Maryland provides for the designation and employment by the Department of Commerce and Labor of such officers, experts, and other technically qualified persons "as may be necessary to cooperate with the Maryland State Board of Shell Fish Commissioners in making a survey of and locating the natural oyster beds, bars, and rocks in the waters within the State of Maryland." The oyster laws of Maryland provide that the Maryland Shell Fish Commissioners, with the aid of such persons as may be designated by the Government, shall proceed "to have laid out, surveyed, and designated on the said charts the natural beds and bars, and shall cause to be marked and defined as accurately as practicable the limits and boundaries of the natural beds, bars, and rocks as established by said survey, and they shall take true and accurate notes of said survey in writing, and make an accurate report of said survey, setting forth such a description of landmarks as may be necessary to enable the said board, or their successors, to find and ascertain the boundary lines of the said natural oyster beds, bars, and rocks, as shown by a delineation on the maps and charts." The oyster laws of Maryland also provide in another section that there shall "be made a true and accurate survey of the natural oyster beds, bars, and rocks * * * with reference to fixed and permanent objects on the shore, giving courses and distances, to be fully described and set out in a written report of said survey."

Under the provisions of the laws quoted above the State of Maryland, in cooperation with the Department of Commerce and Labor, must define the boundaries of the natural oyster bars "as accurately as practicable" and also "with reference to fixed and permanent objects on the shore, giving courses and distances." The requirement of "as accurately as practicable" is easily fulfilled by definition of the location of the corners of the oyster bars by latitude and longitude. In fact, this method is probably the most satisfactory and accurate one that could be used for all purposes of legal definition or for relocation of the oyster-bar boundaries by competent engineers. Therefore the additional requirement of "giving courses and distances" is superfluous and is only fulfilled in the published definitions on account of the specific provisions of the law making it compulsory. This part of the description of boundaries has involved an immense amount of extra computations in order to prevent technical discrepancies between the latitude and longitude of a corner of an oyster bar and its distance and bearing from objects on shore of known latitude and longitude without adding anything to the accuracy and very little to the convenience of practical use of the descriptions of the oyster-bar boundaries.

As provided by law the boundaries of the oyster bars are all straight lines, but in the work already completed they have inclosed areas of all shapes from triangles to complicated 14-sided figures, and of all sizes from 4 acres to 7,548 acres. The sides

have varied in length from 93 to 7,529 yards, and in some cases the corners of the boundaries have been practically at the triangulation stations from which they are located, while in other instances they were over 13,600 yards from the landmarks most available for the purpose of fixing their position.

The varied characteristics of the legal boundaries of the oyster bars indicated by the above statement, together with the complicated requirements of the law under which the survey has been made and the magnitude of the work with the consequent need of fixed and uniform methods, have made the problem of describing the boundaries one of considerable difficulty and great importance.

The boundaries of the oyster bars of Maryland, as established by the Shell Fish Commission and delineated on the Coast and Geodetic Survey charts and projections and on the leasing charts of the Commission, are technically defined and described by a method somewhat different from that used in other oyster surveys. But it is believed that the forms finally adopted will fulfill all needs of the survey for both the present and future.

METHOD OF DESCRIBING BOUNDARIES.

The descriptions have been arranged in tabular form, thus avoiding many hundred repetitions of the same words by making one explanation of the tables sufficient for all oyster bars in each county.

Title.—At the top of each tabular form is given the legal name of the oyster bar to be described, and the one by which it is known and designated in the published oyster records and on the oyster charts. The adopted name of the oyster bar is the one used locally, as nearly as could be ascertained by the hydrographic engineer of the Commission; and when there was no local name in common use a name was selected from one of the prominent features of the vicinity that would naturally suggest the section of the waters where the oyster bar was located.

Underneath the name, in parentheses, is given the general locality of the oyster bar and the serial number of the "Maryland Oyster Chart" on which its legal boundaries are shown.^a

First column.—This column, under the heading of "Corner of bar," gives the number corresponding to the corner of the boundary as shown on the charts and to the number on the buoy marking the actual corner of the bar. The numbers of the corners have been assigned by naming the southernmost point No. 1, thence proceeding in a clockwise direction around the bar; but where a corner of one oyster bar is identical with the corner of the boundaries of one or more other oyster bars only the number of the corner of the oyster bar being described in the table is given in this column.

Second and third columns.—These two columns, under the headings of "Latitude" and "Longitude," give the geographic positions of the corners. These positions have been adopted by the Commission as the primary technical definition of the location of the corners, and should be considered as final in case of a dispute arising from discrepancies caused by other means of location. The latitudes and longitudes given in these columns are based on the United States standard datum of the Coast and Geodetic Survey, and the points thus defined can be relocated from distant triangulation stations

^a These charts can be obtained by application to the Superintendent of the Coast and Geodetic Survey at Washington, D. C.

of the Survey, even though all the landmarks and buoys originally used for their location have been destroyed by natural or other causes.

Fourth and fifth columns.—These two columns, under the general heading of "True bearing"^a and the specific headings "Forward" and "Back," give bearings measured from a true north-and-south line. The three "Forward" bearings are from the corner of the boundary designated in the first column to the triangulation stations named on the corresponding lines in the last column, and the three "Back" bearings are from these same stations in the last column to the corresponding corner of boundary in the first column. The difference in minutes of arc between the forward and back bearings shown in some cases is actual and not accidental, and is due to the fact that the computations took into account the spheroidal shape of the earth.

Sixth column.—This column, under the heading of "Distance," gives the three computed distances in yards from the corner of the bar noted in the first column to the three triangulation stations named on the corresponding lines in the last column, and vice versa.

Seventh column.—This column, under the heading of "U. S. C. & G. S. triangulation station,"^b gives the names of the landmarks from which were computed the corresponding "Latitude," "Longitude," "True bearing," and "Distance" of the "Corner of the bar" designated in the first column. A full description of the location and markings of these triangulation stations is given in another part of this publication under the heading of "Descriptions of triangulation stations."

SURVEYING METHODS FOR RELOCATION OF BOUNDARIES.

There are a number of methods that can be used in the relocation of the actual boundaries of the natural oyster bars as technically described in this publication and delineated on the published charts of the Coast and Geodetic Survey and the leasing charts of the Shell Fish Commission.

The following brief descriptions of five of these more or less different methods assume a certain amount of experience and knowledge on the part of the engineer in the particular kind of surveying under consideration, and are only intended as reminders of ways and means that can be used.

There are two problems that are likely to present themselves to those interested in the boundaries of natural oyster bars: One, to determine whether the buoys marking the corners have been dragged or otherwise moved from their correct positions, and the other, to relocate or reestablish a buoy at the point from which it was removed. The different ways of solving these two problems partly depend upon the instruments possessed by the engineer and his assistants and partly on his training and experience.

(1) *Triangulation.*—This method is the one that will give the greatest accuracy, but on account of its requiring special data and instruments, and being an operation rarely used by engineers not engaged in geodetic surveying, it is recommended only for cases in dispute that can not be settled satisfactorily by some other method. An explanation of this class of work would be too long for a report of this sort, and those

^a The mean magnetic variation for Worcester County was 5° 55' west of north in 1909 and increasing at the rate of 3½' yearly.

^b Geographic positions of these triangulation stations can be obtained by application to the Superintendent of the Coast and Geodetic Survey, Washington, D. C.

not familiar with this method are referred to the publications on the subject by the Coast and Geodetic Survey.

(2) *Hydrographic*.—This method is the most simple and satisfactory one that can be adopted if the surveyor can obtain the use of the necessary instruments and assistants. It is the one best suited for the work of the engineers of the Commission in relocating corners of boundaries, as it gives results of the accuracy ordinarily required and is rapid in execution. Besides, it has the advantage of being available whenever three triangulation stations of suitable relative positions are visible from the offshore points needing relocation.

Most navigators and others familiar with the use of a sextant are well acquainted with the graphic three-point method of fixing a position on water, and only a brief description of the operation will be stated.

In the case where there is only one engineer having a single sextant, the three-point method can be used if the two angles determining the position of a buoy are first derived from the "Forward" bearings given in the tabular forms describing the boundaries of the oyster bars. For example, take "South Point" bar, which is the first one described in this publication, and assume that "Corner No. 3," is to be examined as to its position. The angle between the two landmarks "Birch" and "Neck" as determined from right to left from the forward bearings from this corner is $59^{\circ} 11'$ and the angle between "Neck" and "Newport" is $49^{\circ} 44'$. Having these two angles, the engineer proceeds to the buoy of doubtful location and measures the actual sextant angles between the landmarks for which the calculations were made. If the measured and calculated angles do not agree the buoy is not in its correct position and the boundary corner must be relocated. This is accomplished by moving the boat about until a point is reached where the angles do agree, and this point being the desired location, the buoy can be placed in its correct position.

If the engineer can obtain the use of both a sextant and a three-arm protractor ("position finder"), the availability of the hydrographic method is increased, as the use of the protractor is essential in case of the washing away or destruction of one or more of the landmarks originally used in describing the boundaries. Under these circumstances, any three landmarks of suitable relative position that are visible from the point to be located can be utilized. For example, the engineer can proceed to the buoy of doubtful position and measure the two adjacent sextant angles between the three landmarks selected. These two angles are set off on the three-arm protractor and the actual position of the buoy plotted on the chart by shifting the protractor about until the edge of each of the three arms passes through the center of the symbols on the chart marking the position of the three landmarks selected. The center of the hub of the protractor will indicate on the chart the actual position of the buoy, and if the point thus obtained does not coincide with the true position of the corner of the boundary as given on the chart, the surveyor can proceed to locate the buoy correctly by reversing the operation. This is done by placing the center point of the hub of the protractor over the corner of the boundary in question and measuring on the chart the two adjacent protractor angles between the three selected landmarks. One of the angles thus obtained is set on the sextant and the boat moved about until the two landmarks are shown by the sextant to subtend the same angle obtained from the

protractor. The second angle is then placed on the sextant and the same operation gone through, and so on, first using one angle on the sextant then the other until a point is reached where both observed sextant angles are practically identical with the protractor angles. The point thus located is the desired one and the buoy can be placed to mark the true position of the corner of the boundary in question.

If the engineer possesses two sextants and a protractor, this problem is far easier of solution, as the two angles can be set off on separate sextants and the observer can quickly find the desired point where they agree with the protractor angles by using one sextant after the other without the need of resetting either.

If there are two observers, two sextants, and a protractor, it can be seen that the best conditions for both rapid and accurate hydrographic locations of points are attained; in fact, this is the method by which the buoys at the corners of the boundaries were originally placed by the hydrographic engineer to the Commission.

(3) *Magnetic bearings from offshore.*—This method of fixing a position on water is a simple and well-known one in navigation. It is available to anyone having a boat compass and will be of special use to the State fishery force in investigating cases where buoys are supposed to have been moved for illegal purposes.

In the case where a buoy is supposed to have been moved from its true position the observer takes compass bearings to the three landmarks given in the last column of the tables opposite the boundary corner in question. These bearings are then corrected for the local declination,^a and if the results agree with the published bearings the buoy is correctly located.

In the case where the buoy is not in its correct position, or has disappeared altogether, the desired point can be determined by maneuvering the vessel until the corrected bearings agree with the ones in the tabular descriptions, when the buoy can be anchored in its proper location.

In the case where the landmarks for which the bearings are published have been destroyed or washed away, any landmarks whose positions are indicated on the charts can be used by getting their bearings directly from the chart by parallel rulers or a protractor and then applying them in the same manner as the ones published in the tables.

(4) *Magnetic bearings from shore.*—This method will be of special value to engineers having an ordinary surveyor's compass. The compass can be set over the point marking a "triangulation station" on shore, the name of which is given in the last column opposite the "corner" in question. The instrument is then set at the corresponding "back" bearing (corrected for local magnetic declination) given in the fourth column of the tables opposite the "corner" in question, and the direction thus determined will give one range on which the desired point must be located. The compass can then be moved to a second triangulation station and another range located in a similar manner. The intersection of these two range lines will give the desired point; but in general it should be checked by an additional range line determined from a third station.

(5) *Horizontal angles measured at landmarks.*—This process is a modification of the triangulation method, and will be useful to engineers who have a transit and desire considerable accuracy.

^a The mean magnetic variation for Worcester County is 5° 55' west of north in 1909 and increasing at the rate of 3½' yearly.

The instrument is placed over a "triangulation station," the name of which appears in the last column of the tabular description opposite the "corner" in question. The telescope is then pointed to the landmark indicated in the "Descriptions of landmarks" as having a direction of $0^{\circ} 00' 00''$ from the triangulation station being occupied by the transit. The tabular description of the boundaries is next examined and the "back" bearing of the questionable boundary "corner" from the landmark being occupied is taken out. The angle calculated from this "back" bearing and the bearing given in parentheses alongside the zero landmark in the "Descriptions of landmarks" is then set off on the transit, and a range line established on which the desired point must be located. A similar process is then carried on at a second station, and so on until the position of the buoy is satisfactorily fixed.

BOUNDARIES OF NATURAL OYSTER BARS.

SOUTH POINT.

(Newport Bay—Charts Nos. 13 and 14.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "		
1	38 12 03.48	75 13 05.54	N 53 17 E	S 53 18 W	2683	Birch.
			N 19 15 E	S 19 16 W	4408	Neck.
			N 71 48 W	S 71 49 E	3082	Handys Hammock.
2	38 12 26.10	75 13 18.36	N 71 22 E	S 71 23 W	2628	Birch.
			N 27 50 E	S 27 50 W	3844	Neck.
			N 85 34 W	S 85 35 E	2595	Handys Hammock.
3	38 12 48.39	75 13 04.82	N 87 38 E	S 87 38 W	2133	Birch.
			N 28 27 E	S 28 27 W	3011	Neck.
			N 21 17 W	S 21 18 E	3024	Newport.
4	38 12 34.39	75 12 47.18	N 71 22 E	S 71 23 W	1753	Birch.
			N 17 12 E	S 17 12 W	3265	Neck.
			N 25 28 W	S 25 29 E	3644	Newport.

HANDYS HAMMOCK.

(Newport Bay—Charts Nos. 13 and 14.)

Corner of bar	Latitude	Longitude	True bearing		Yards.	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "		
1	38 12 06.72	75 14 10.98	N 60 00 E	S 69 01 W	4168	Birch.
			N 8 54 E	S 8 55 W	4275	Newport.
			N 54 17 W	S 54 17 E	1462	Handys Hammock.
2	38 12 08.22	75 14 20.24	N 70 45 E	S 70 47 W	4381	Birch.
			N 12 17 E	S 12 17 W	4270	Newport.
			N 49 31 W	S 49 31 E	1236	Handys Hammock.
3	38 12 23.50	75 14 26.40	N 77 49 E	S 77 51 W	4400	Birch.
			N 16 20 E	S 16 21 W	3811	Newport.
			N 69 41 W	S 69 41 E	828	Handys Hammock.
4	38 12 23.64	75 14 13.18	N 76 48 E	S 76 50 W	4046	Birch.
			N 11 09 E	S 11 10 W	3723	Newport.
			N 75 56 W	S 75 56 E	1164	Handys Hammock.

NEWPORT.

(Newport Bay—Charts Nos. 13 and 14.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 11 48.98	75 13 32.00	N 53 46 E	S 53 47 W	3538	Birch.
			N 4 27 W	S 4 27 E	4836	Newport.
			N 56 52 W	S 56 53 E	2656	Handys Hammock.
2	38 11 50.08	75 13 52.90	N 58 55 E	S 58 57 W	3981	Birch.
			N 2 10 E	S 2 10 W	4788	Newport.
			N 49 42 W	S 49 43 E	2187	Handys Hammock.
3	38 12 06.38	75 13 44.00	N 64 37 E	S 64 38 W	3512	Birch.
			N 0 45 W	S 0 45 E	4234	Newport.
			N 65 34 W	S 65 35 E	2092	Handys Hammock.
4	38 12 11.78	75 13 23.40	N 63 15 E	S 63 16 W	2938	Birch.
			N 8 28 W	S 8 29 E	4097	Newport.
			N 74 26 W	S 74 27 E	2546	Handys Hammock.

LAMBERTSON LANDING.

(Upper Chincoteague Bay—Chart No. 14.)

	Latitude	Longitude	True bearing		Yards.	
			° ' "	° ' "		
1	38 11 19.54	75 14 54.94	N 58 38 E	S 58 40 W	5926	Birch.
			N 80 24 W	S 80 24 E	2445	Handys Hammock.
			S 26 23 W	N 26 22 E	3350	Ricks.
2	38 11 48.19	75 15 08.00	S 16 02 W	N 16 02 E	4127	Ricks.
			N 68 36 E	S 68 38 W	5808	Birch.
			N 12 35 E	S 12 36 W	1515	Handys Hammock.
3	38 11 58.98	75 14 53.63	S 19 28 W	N 19 28 E	4593	Ricks.
			N 70 44 E	S 70 46 W	5324	Birch.
			N 2 41 W	S 2 41 E	1115	Handys Hammock.
4	38 11 46.83	75 14 34.34	N 64 22 E	S 64 24 W	5004	Birch.
			N 20 21 W	S 20 21 E	1625	Handys Hammock.
			S 27 27 W	N 27 26 E	4418	Ricks.
5	38 11 38.04	75 14 41.03	N 62 18 E	S 62 20 W	5296	Birch.
			N 12 01 W	S 12 01 E	1861	Handys Hammock.
			S 27 09 W	N 27 08 E	4073	Ricks.

ENNIS.

(Upper Chincoteague Bay—Chart No. 14.)

	Latitude	Longitude	True bearing		Yards.	
			° ' "	° ' "		
1	38 11 13.38	75 14 17.68	N 51 01 E	S 51 03 W	5234	Birch.
			N 20 49 W	S 20 50 E	2837	Handys Hammock.
			S 41 37 W	N 41 36 E	3735	Ricks.
2	38 11 38.04	75 14 41.03	N 62 18 E	S 62 20 W	5296	Birch.
			N 12 01 W	S 12 01 E	1861	Handys Hammock.
			S 27 09 W	N 27 08 E	4073	Ricks.

ENNIS—Continued.

(Upper Chincoteague Bay—Chart No. 14)—Continued.

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "	Yards.	
3	38 11 46.83	75 14 34.34	N 64 22 E	S 64 24 W	5004	Birch.
			N 20 21 W	S 20 21 E	1625	Handys Hammock.
			S 27 27 W	N 27 26 E	4418	Ricks.
4	38 11 24.96	75 13 59.52	N 51 01 E	S 51 02 W	4613	Birch.
			N 33 25 W	S 33 25 E	2709	Handys Hammock.
			S 42 57 W	N 42 56 E	4349	Ricks.

TURPIN.

(Upper Chincoteague Bay—Chart No. 14.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 10 21.84	75 14 43.82	N 43 26 E	S 43 28 W	6929	Birch.
			N 4 05 W	S 4 05 E	4401	Handys Hammock
			S 59 25 W	N 59 24 E	2072	Ricks.
2	38 10 34.30	75 14 45.38	N 46 11 E	S 46 13 W	6660	Birch.
			N 3 55 W	S 3 55 E	3978	Handys Hammock.
			S 49 46 W	N 49 45 E	2283	Ricks.
3	38 10 26.78	75 14 27.84	N 41 44 E	S 41 46 W	6518	Birch.
			N 9 57 W	S 9 57 E	4288	Handys Hammock.
			S 61 04 W	N 61 03 E	2525	Ricks.

SANDY POINT.

(Upper Chincoteague Bay—Chart No. 14.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 09 51.26	75 14 32.04	N 6 36 W	S 6 36 E	5457	Handys Hammock.
			S 89 11 W	N 89 10 E	2099	Ricks.
			S 46 14 E	N 46 13 W	4828	Beacon Clumps.
2	38 09 56.78	75 14 40.00	N 4 32 W	S 4 32 E	5251	Handys Hammock.
			S 83 39 W	N 83 39 E	1897	Ricks.
			S 46 26 E	N 46 24 W	5105	Beacon Clumps.
3	38 10 08.48	75 14 36.78	N 5 54 W	S 5 54 E	4867	Handys Hammock.
			S 72 58 W	N 72 57 E	2063	Ricks.
			S 42 43 E	N 42 42 W	5325	Beacon Clumps.
4	38 10 05.78	75 14 22.98	N 9 59 W	S 9 59 E	5008	Handys Hammock.
			S 77 38 W	N 77 37 E	2395	Ricks.
			S 40 20 E	N 40 22 W	5014	Beacon Clumps.

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ROBINS MARSH.

(Upper Chincoteague Bay—Chart No. 14.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 09 06.48	75 15 35.79	N 15 05 W	S 15 06 E	1539	Ricks.
			S 83 42 W	N 83 41 E	2630	Guilberts Cupola.
			S 35 48 W	N 35 46 E	5328	Landlet.
2	38 09 22.32	75 15 53.78	N 4 42 E	S 4 42 W	955	Ricks.
			S 68 56 W	N 68 55 E	2287	Guilberts Cupola.
			S 28 35 W	N 28 34 E	5536	Landlet.
3	38 09 35.39	75 15 42.96	N 22 19 W	S 22 19 E	552	Ricks.
			S 62 28 W	N 62 27 E	2733	Guilberts Cupola.
			S 62 31 E	N 62 29 W	6060	Beacon Clumps.
4	38 09 40.61	75 14 49.94	N 78 19 W	S 78 20 E	1656	Ricks.
			S 69 26 W	N 69 25 E	4096	Guilberts Cupola.
			S 53 08 E	N 53 06 W	4955	Beacon Clumps.
5	38 09 29.59	75 14 46.23	N 67 39 W	S 67 40 E	1860	Ricks.
			S 74 50 W	N 74 48 E	4076	Guilberts Cupola.
			S 56 03 E	N 56 02 W	4659	Beacon Clumps.
6	38 09 27.20	75 15 03.23	N 58 09 W	S 58 10 E	1493	Ricks.
			S 74 11 W	N 74 09 E	3619	Guilberts Cupola.
			S 59 43 E	N 59 41 W	5000	Beacon Clumps.
7	38 09 14.54	75 15 08.41	N 42 56 W	S 42 56 E	1658	Ricks.
			S 80 30 W	N 80 28 E	3390	Guilberts Cupola.
			S 64 50 E	N 64 48 W	4923	Beacon Clumps.

SCARBORO CREEK.

(Upper Chincoteague Bay—Chart No. 14.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 08 40.78	75 16 00.00	N 5 55 E	S 5 55 W	2365	Ricks.
			N 73 38 W	S 73 37 E	2053	Guilberts Cupola.
			S 35 34 W	N 35 33 E	4249	Landlet.
2	38 09 04.47	75 16 08.42	N 16 46 E	S 16 46 W	1623	Ricks.
			S 82 48 W	N 82 49 E	1760	Guilberts Cupola.
			S 27 50 W	N 27 50 E	4812	Landlet.
3	38 09 22.32	75 15 53.78	N 4 42 E	S 4 42 W	955	Ricks.
			S 68 56 W	N 68 55 E	2287	Guilberts Cupola.
			S 28 35 W	N 28 34 E	5536	Landlet.
4	38 09 06.48	75 15 35.79	N 15 05 W	S 15 06 E	1539	Ricks.
			S 83 42 W	N 83 41 E	2630	Guilberts Cupola.
			S 35 48 W	N 35 46 E	5328	Landlet.

SOUTHWEST.

(Upper Chincoteague Bay—Chart No. 14.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 08 32.04	75 15 26.63	N 13 41 W	S 13 41 E	2724	Ricks. Guilberts Cupola. Landlet.
			N 73 01 W	S 73 02 E	2988	
			S 46 45 W	N 46 44 E	4613	
2	38 08 32.11	75 15 38.94	N 6 50 W	S 6 50 E	2664	Ricks. Guilberts Cupola. Landlet.
			N 71 01 W	S 71 02 E	2676	
			S 43 47 W	N 43 46 E	4382	
3	38 08 47.04	75 15 30.98	N 13 52 W	S 13 52 E	2206	Ricks. Guilberts Cupola. Landlet.
			N 82 22 W	S 82 23 E	2767	
			S 41 26 W	N 41 25 E	4902	

PURNELL HAMMOCK.

(Middle Chincoteague Bay—Chart No. 14.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 06 06.82	75 16 59.60	S 77 09 E	N 77 07 W	5797	Turnagain. Landlet. Tizz.
			N 26 59 W	S 27 00 E	1947	
			S 53 51 W	N 53 49 E	5879	
2	38 06 11.34	75 17 15.40	S 76 39 E	N 76 37 W	6242	Turnagain. Landlet. Tizz.
			N 16 18 W	S 16 18 E	1649	
			S 50 04 W	N 50 02 E	5641	
3	38 06 15.60	75 17 13.42	S 75 15 E	N 75 13 W	6226	Turnagain. Landlet. Tizz.
			N 19 40 W	S 19 40 E	1528	
			S 49 19 W	N 49 17 E	5774	

BEEF CREEK.

(Middle Chincoteague Bay—Charts Nos. 14 and 15.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 05 51.48	75 17 52.41	N 13 05 E	S 13 05 W	2312	Landlet. Tizz. Mill.
			S 48 32 W	N 48 31 E	4455	
			S 28 23 W	N 28 23 E	6045	
2	38 05 54.26	75 17 54.88	N 15 16 E	S 15 16 W	2238	Landlet. Tizz. Mill.
			S 47 04 W	N 47 02 E	4471	
			S 27 26 W	N 27 25 E	6098	
3	38 05 56.94	75 17 42.48	N 7 08 E	S 7 08 W	2084	Landlet. Tizz. Mill.
			S 48 58 W	N 48 57 E	4777	
			S 29 42 W	N 29 41 E	6334	
4	38 05 52.72	75 17 44.78	N 8 14 E	S 8 14 W	2233	Landlet. Tizz. Mill.
			S 49 48 W	N 49 47 E	4638	
			S 29 52 W	N 29 51 E	6180	
5	38 05 53.78	75 17 48.02	N 10 35 E	S 10 35 W	2212	Landlet. Tizz. Mill.
			S 48 46 W	N 48 45 E	4595	
			S 29 00 W	N 28 59 E	6169	

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RATTLESNAKE.

(Middle Chincoteague Bay—Charts Nos. 14 and 15.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
			° ' "	° ' "		
1	38 05 38.00	75 18 03.18	N 16 40 E	S 16 40 W	Yards. 2826	Landlet.
			S 50 43 W	N 50 41 E	3944	Tizz.
			S 28 01 W	N 28 00 E	5510	Mill.
2	38 05 43.19	75 18 26.62	N 29 32 E	S 29 33 W	2910	Landlet.
			S 42 15 W	N 42 14 E	3610	Tizz.
			S 21 17 W	N 21 16 E	5409	Mill.
3	38 05 44.86	75 18 26.26	N 29 56 E	S 29 56 W	2856	Landlet.
			S 41 46 W	N 41 45 E	3658	Tizz.
			S 21 09 W	N 21 09 E	5354	Mill.
4	38 05 45.06	75 18 05.24	N 19 19 E	S 19 19 W	2616	Landlet.
			S 47 37 W	N 47 35 E	4957	Tizz.
			S 26 24 W	N 26 23 E	5695	Mill.

MARTIN POINT.

(Middle Chincoteague Bay—Charts Nos. 14 and 15.)

	°	'	"	°	'	"	°	'		°	'		Yards.			
1	38	05	14.44	75	17	53.44	N	8	56	E	S	8	56	W	3544	Landlet.
							S	62	47	W	N	62	46	E	3724	Tizz.
							S	34	59	W	N	34	58	E	4966	Mill.
2	38	05	37.54	75	17	56.64	N	13	09	E	S	13	09	W	2795	Landlet
							S	52	26	W	N	52	25	E	4070	Tizz.
							S	29	37	W	N	29	36	E	5576	Mill.
3	38	05	41.75	75	17	47.56	N	8	41	E	S	8	41	W	2601	Landlet.
							S	52	54	W	N	52	52	E	4348	Tizz.
							S	30	59	W	N	30	58	E	5834	Mill.
4	38	05	25.42	75	17	34.24	N	0	43	E	S	0	43	W	3132	Landlet.
							S	61	32	W	N	61	31	E	4349	Tizz.
							S	37	07	W	N	37	05	E	5568	Mill.

DIAMOND.

(Middle Chincoteague Bay—Charts Nos. 14 and 15.)

	°	'	"	°	'	"	°	'	°	'	Yards.	
1	38	05	35.23	75	16	45.20	S 87 34 E	N 87 32 W	5273	Turnagain.		
							N 24 21 W	S 24 21 E	3071	Landlet.		
							S 64 54 W	N 64 52 E	5665	Tizz.		
2	38	05	47.16	75	16	57.82	S 83 38 E	N 83 36 W	5640	Turnagain.		
							N 21 13 W	S 21 14 E	2572	Landlet.		
							S 59 40 W	N 59 38 E	5554	Tizz.		
3	38	05	42.50	75	16	40.28	S 84 47 E	N 84 45 W	5159	Turnagain.		
							N 28 41 W	S 28 42 E	2912	Landlet.		
							S 63 17 W	N 63 15 E	5890	Tizz.		

SHEEP.

(Middle Chincoteague Bay—Chart No. 15.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 04 03.59	75 19 09.02	N 23 31 E	S 23 32 W	6425	Landlet.
			N 62 08 W	S 62 09 E	1466	Tizz.
			S 26 20 W	N 26 20 E	1876	Mill.
2	38 04 19.44	75 19 20.58	N 28 12 E	S 28 13 W	6077	Landlet.
			N 81 19 W	S 81 19 E	1000	Tizz.
			S 13 19 W	N 13 19 E	2277	Mill.
3	38 04 16.94	75 19 05.45	N 24 24 E	S 24 26 W	5974	Landlet.
			N 80 24 W	S 80 25 E	1412	Tizz.
			S 23 31 W	N 23 30 E	2324	Mill.
4	38 04 11.44	75 18 58.79	N 22 10 E	S 22 11 W	6075	Landlet.
			N 74 59 W	S 75 00 E	1625	Tizz.
			S 29 35 W	N 29 35 E	2238	Mill.

MINK TUMP.

(Middle Chincoteague Bay—Chart No. 15.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 04 12.42	75 18 51.98	N 20 40 E	S 20 41 W	5978	Landlet.
			N 77 29 W	S 77 30 E	1794	Tizz.
			S 33 02 W	N 33 01 E	2360	Mill.
2	38 04 21.76	75 18 50.49	N 21 25 E	S 21 26 W	5668	Landlet.
			N 87 40 W	S 87 41 E	1792	Tizz.
			S 30 02 W	N 30 01 E	2649	Mill.
3	38 04 19.78	75 18 44.38	N 19 39 E	S 19 39 W	5675	Landlet.
			N 85 55 W	S 85 56 E	1959	Tizz.
			S 33 46 W	N 33 45 E	2678	Mill.

EASTER COVE.

(Middle Chincoteague Bay—Chart No. 15.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 04 22.64	75 18 40.08	N 18 52 E	S 18 53 W	5546	Landlet.
			N 88 48 W	S 88 49 E	2069	Tizz.
			S 34 37 W	N 34 36 E	2823	Mill.
2	38 04 26.58	75 18 45.34	N 20 42 E	S 20 43 W	5468	Landlet.
			S 87 20 W	N 87 19 E	1930	Tizz.
			S 30 47 W	N 30 47 E	2859	Mill.
3	38 04 31.64	75 18 32.15	N 17 44 E	S 17 45 W	5190	Landlet.
			S 83 30 W	N 83 29 E	2294	Tizz.
			S 34 38 W	N 34 38 E	3193	Mill.

Survey of Oyster Bars, Worcester County, Md.

BIG BAY POINT.

(Middle Chincoteague Bay—Chart No. 15.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 04 14.08	75 17 22.42	N 2 51 W S 85 24 W S 61 02 W	S 2 51 E N 85 26 E N 61 01 E	5543 4150 4199	Landlet. Tizz. Mill.
2	38 04 22.06	75 17 34.93	N 0 38 E N 89 30 W S 55 04 W	S 0 38 W S 89 32 E N 55 03 E	5238 3804 4075	Landlet. Tizz. Mill.
3	38 04 29.15	75 17 27.00	N 1 45 W S 87 30 W S 54 25 W	S 1 45 E N 87 28 E N 54 23 E	5031 4019 4368	Landlet Tizz. Mill.
4	38 04 20.42	75 17 14.93	N 5 06 W N 88 26 W S 59 53 W	S 5 06 E S 88 27 E N 59 51 E	5344 4338 4478	Landlet. Tizz. Mill.

KENNEL.

(Middle Chincoteague Bay—Chart No. 15.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 04 12.60	75 16 55.22	N 10 12 W N 85 30 W S 65 44 W	S 10 12 E S 85 32 E N 65 42 E	5676 4879 4826	Landlet. Tizz. Mill.
2	38 04 34.50	75 17 01.40	N 9 47 W S 85 40 W S 57 16 W	S 9 47 E N 85 39 E N 57 14 E	4919 4712 5034	Landlet. Tizz. Mill.
3	38 04 36.62	75 16 41.80	N 15 52 W S 85 20 W S 59 35 W	S 15 53 E N 85 19 E N 59 32 E	4966 5238 5516	Landlet. Tizz. Mill.
4	38 04 20.50	75 16 38.19	N 15 19 W N 88 44 W S 65 08 W	S 15 20 E S 88 46 E N 65 06 E	5503 5318 5349	Landlet. Tizz. Mill.

DRUM.

(Middle Chincoteague Bay—Chart No. 15.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 04 16.77	75 16 09.80	N 87 42 W S 69 16 W S 20 02 E	S 87 45 E N 69 14 E N 20 01 W	6078 5998 6100	Tizz. Mill. Pope Island L. S. S.
2	38 04 30.80	75 16 24.88	S 87 40 W S 63 30 W S 21 53 E	N 87 38 E N 63 32 E N 21 52 W	5677 5820 6686	Tizz. Mill. Pope Island L. S. S.
3	38 04 26.84	75 15 56.74	S 89 09 W S 67 33 W S 16 00 E	N 89 06 E N 67 30 E N 15 58 W	6423 6448 6316	Tizz. Mill. Pope Island L. S. S.

TOBY.

(Middle Chincoteague Bay—Chart No. 15.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 03 53.19	75 17 41.43	N 74 04 W	S 74 05 E	3776	Tizz.
			S 67 14 W	N 67 13 E	3435	Mill.
			S 42 34 E	N 42 33 W	6702	Pope Island L. S. S.
2	38 04 18.79	75 17 52.86	N 87 01 W	S 87 02 E	3331	Tizz.
			S 52 33 W	N 52 32 E	3606	Mill.
			S 39 50 E	N 39 48 W	7552	Pope Island L. S. S.
3	38 04 12.21	75 17 35.28	N 84 03 W	S 84 05 E	3816	Tizz.
			S 59 23 W	N 59 22 E	3870	Mill.
			S 38 04 E	N 38 04 W	7084	Pope Island L. S. S.
4	38 03 55.12	75 17 30.78	N 76 04 W	S 76 05 E	4034	Tizz.
			S 68 00 W	N 67 59 E	3723	Mill.
			S 40 21 E	N 40 19 W	6562	Pope Island L. S. S.

DEEP WATER.

(Middle Chincoteague Bay—Chart No. 15.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 03 46.83	75 17 09.71	N 74 23 W	S 74 25 E	4649	Tizz.
			S 74 29 W	N 74 27 E	4164	Mill.
			S 37 59 E	N 37 58 W	5991	Pope Island L. S. S.
2	38 03 56.42	75 17 04.20	N 78 39 W	S 78 40 E	4717	Tizz.
			S 70 56 W	N 70 54 E	4402	Mill.
			S 35 03 E	N 35 02 W	6164	Pope Island L. S. S.
3	38 03 51.90	75 16 59.53	N 77 10 W	S 77 12 E	4870	Tizz.
			S 73 18 W	N 73 16 E	4473	Mill.
			S 34 55 E	N 34 54 W	5967	Pope Island L. S. S.

STRIKING MARSH.

(Middle Chincoteague Bay—Chart No. 15.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 03 34.77	75 16 44.41	N 72 09 W	S 72 11 E	5412	Tizz.
			S 81 25 W	N 81 23 E	4741	Mill.
			S 34 55 E	N 34 54 W	5262	Pope Island L. S. S.
2	38 03 57.94	75 16 21.85	N 81 20 W	S 81 21 E	5819	Tizz.
			S 74 17 W	N 74 15 E	5494	Mill.
			S 25 19 E	N 25 18 W	5639	Pope Island L. S. S.
3	38 03 39.24	75 16 13.66	N 75 49 W	S 75 52 E	6159	Tizz.
			S 81 09 W	N 81 07 E	5574	Mill.
			S 26 08 E	N 26 07 W	4975	Pope Island L. S. S.

Survey of Oyster Bars, Worcester County, Md.

LEVIN TUMP.

(Middle Chincoteague Bay—Chart No. 15.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 03 30.84	75 16 09.40	N 73 36 W	S 73 38 E	6343	Tizz.
			S 84 10 W	N 84 07 E	5651	Mill.
			S 26 25 E	N 26 22 W	4671	Pope Island L. S. S.
2	38 03 52.17	75 15 52.18	N 80 41 W	S 80 44 E	6630	Tizz.
			S 77 59 W	N 77 57 E	6216	Mill.
			S 18 16 E	N 18 16 W	5163	Pope Island L. S. S.
3	38 03 31.68	75 15 54.96	N 74 45 W	S 74 47 E	6699	Tizz.
			S 84 16 W	N 84 14 E	6037	Mill.
			S 21 44 E	N 21 43 W	4540	Pope Island L. S. S.

WHITE ROCK.

(Middle Chincoteague Bay—Chart No. 15.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 02 56.80	75 17 24.72	N 54 13 W	S 54 15 E	5025	Tizz.
			N 81 00 W	S 81 02 E	3658	Mill.
			S 53 24 E	N 53 23 W	5101	Pope Island L. S. S.
2	38 03 34.64	75 17 56.02	N 62 52 W	S 62 53 E	3645	Tizz.
			S 75 46 W	N 75 45 E	2866	Mill.
			S 48 48 E	N 48 46 W	6542	Pope Island L. S. S.
3	38 03 48.58	75 17 39.85	N 72 01 W	S 72 03 E	3863	Tizz.
			S 69 54 W	N 69 53 E	3418	Mill.
			S 43 13 E	N 43 11 W	6559	Pope Island L. S. S.
4	38 03 34.38	75 17 08.04	N 69 43 W	S 69 44 E	4821	Tizz.
			S 80 17 W	N 80 15 E	4116	Mill.
			S 40 15 E	N 40 14 W	5636	Pope Island L. S. S.
5	38 03 09.81	75 17 02.78	N 61 48 W	S 61 49 E	5290	Tizz.
			N 88 11 W	S 88 12 E	4199	Mill.
			S 45 14 E	N 45 12 W	4933	Pope Island L. S. S.

HORSEHEAD NORTH.

(Middle Chincoteague Bay—Chart No. 15.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 02 51.57	75 15 49.34	N 83 03 W	S 83 06 E	6202	Mill.
			S 14 46 E	N 14 46 W	2698	Md.-Va. (Pope Island.)
			S 28 21 E	N 28 21 W	3249	Pope Island L. S. S.
2	38 02 56.14	75 15 59.71	N 84 13 W	S 84 15 E	5910	Mill.
			S 19 14 E	N 19 14 W	2926	Md.-Va. (Pope Island.)
			S 31 08 E	N 31 07 W	3520	Pope Island L. S. S.
3	38 02 59.21	75 15 49.61	N 85 26 W	S 85 28 E	6168	Mill.
			S 13 37 E	N 13 37 W	2951	Md.-Va. (Pope Island.)
			S 26 27 E	N 26 26 W	3481	Pope Island L. S. S.
4	38 02 55.20	75 15 45.38	N 84 24 W	S 84 26 E	6426	Mill.
			S 9 20 E	N 9 19 W	2768	Md.-Va. (Pope Island.)
			S 23 37 E	N 23 37 W	3255	Pope Island L. S. S.

HORSEHEAD SOUTH.

(Middle Chincoteague Bay—Chart No. 15.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "	Yards.	
1	38 02 34.50	75 16 07.00	N 76 53 W	S 76 55 E	5838	Mill.
			S 29 40 E	N 29 40 W	2340	Md.-Va. (Pope Island.)
			S 41 25 E	N 41 24 W	3045	Pope Island L. S. S.
2	38 02 42.51	75 16 17.94	N 78 56 W	S 78 58 E	5495	Mill.
			S 32 12 E	N 32 11 W	2723	Md.-Va. (Pope Island.)
			S 42 05 E	N 42 04 W	3440	Pope Island L. S. S.
3	38 02 46.34	75 15 57.02	N 81 09 W	S 81 12 E	6022	Mill.
			S 20 09 E	N 20 08 W	2592	Md.-Va. (Pope Island.)
			S 33 05 E	N 33 05 W	3202	Pope Island L. S. S.
4	38 02 38.46	75 15 56.34	N 78 43 W	S 78 45 E	6087	Mill.
			S 21 59 E	N 21 59 W	2337	Md.-Va. (Pope Island.)
			S 35 36 E	N 35 36 W	2972	Pope Island L. S. S.

APPENDIXES.

APPENDIX A.—LAWS RELATING TO THE COOPERATION OF THE COAST AND GEODETIC SURVEY AND BUREAU OF FISHERIES WITH THE MARYLAND SHELL FISH COMMISSION.

The work of the Coast and Geodetic Survey and of the Bureau of Fisheries, in cooperation with the Maryland Shell Fish Commission, in surveying the oyster bars, establishing permanent landmarks at triangulation stations, and preparing for publication the necessary charts and technical and legal descriptions of boundaries and landmarks shown on these charts, has been executed in compliance with a request from the governor of the State of Maryland to the Secretary of Commerce and Labor, and by the authority of the following laws of the United States and Maryland:

[Act of Congress approved May 26, 1906.]

AN ACT To authorize the Secretary of Commerce and Labor to cooperate, through the Bureau of the Coast and Geodetic Survey and the Bureau of Fisheries, with the shellfish commissioners of the State of Maryland in making surveys of the natural oyster beds, bars, and rocks in the waters within the State of Maryland.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of Commerce and Labor be, and he is hereby, authorized and directed, upon the request of the governor of the State of Maryland, to designate such officers, experts, and employees of the Bureau of the Coast and Geodetic Survey and of the Bureau of Fisheries as may be necessary to cooperate with the Maryland State board of shellfish commissioners in making a survey of and locating the natural oyster beds, bars, and rocks in the waters within the State of Maryland; and the Secretary of Commerce and Labor is hereby authorized and directed to furnish to the officers, experts, and employees of said Bureaus so detailed as aforesaid such instruments, appliances, and steam launches as may be necessary to make the survey aforesaid; and the Secretary of Commerce and Labor is hereby authorized to have made in the Bureau of the Coast and Geodetic Survey all the plats necessary to show the results of the aforesaid survey and the locations of the said natural oyster beds, bars, and rocks in the waters within the State of Maryland, and to furnish to the board of shellfish commissioners of the State of Maryland such copies as may be necessary, and for this purpose to employ, in the District of Columbia and elsewhere, such technically qualified persons as may be necessary to carry out the purpose of this act.

SEC. 2. That the Secretary of Commerce and Labor is hereby further authorized to have erected or constructed by the officers so detailed as aforesaid, while making such survey, such structures as may be necessary to mark the points of triangulation, so that the same may be used for such future work of the Coast and Geodetic Survey as the said Bureau may be hereafter required to perform in prosecuting the Government coast survey of the navigable waters of the United States located within the State of Maryland.

* * * * *

SEC. 4. That this act shall take effect from the date of its passage.

Survey of Oyster Bars, Worcester County, Md.

[Act of Congress approved June 30, 1906.]

AN ACT Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and seven, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated, for the objects hereinafter expressed, for the fiscal year ending June thirtieth, nineteen hundred and seven, namely: * * *

COAST AND GEODETIC SURVEY: * * * For any special surveys * * * including the expenditures authorized under Public Act Numbered One hundred and eighty-one, approved May twenty-sixth, nineteen hundred and six, and contingent expenses incident thereto, five thousand dollars, together with the unexpended balance under this appropriation for nineteen hundred and six and prior years which is hereby reappropriated and made available on this account for the fiscal year nineteen hundred and seven. * * *

[Act of Congress approved March 4, 1907.]

AN ACT Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and eight, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated, for the objects hereinafter expressed, for the fiscal year ending June thirtieth, nineteen hundred and eight, namely: * * *

COAST AND GEODETIC SURVEY: * * * For any special surveys * * * including expenses of surveys in aid of the shellfish commission of the State of Maryland, to be immediately available and to continue available until expended twenty-five thousand dollars. * * *

[Act of Congress approved May 27, 1908.]

AN ACT Making appropriations for sundry civil expenses of the Government for the fiscal year ending June thirtieth, nineteen hundred and nine, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the following sums be, and the same are hereby, appropriated, for the objects hereinafter expressed, for the fiscal year ending June thirtieth, nineteen hundred and nine, namely: * * *

COAST AND GEODETIC SURVEY: * * * For any special surveys * * * including expenses of surveys in aid of the shellfish commission of the State of Maryland, which expenses, including cost of plats and charts, shall not exceed fifteen thousand dollars in any one year, to be immediately available, twenty thousand dollars.

[Act of the legislature of Maryland approved April 2, 1906.]

AN ACT To establish and promote the industry of oyster culture in Maryland, to define and mark natural oyster beds, bars and rocks lying under the waters of this State, to prescribe penalties for the infringement of the provisions of this Act, and * * *

SECTION 1. *Be it enacted by the General Assembly of Maryland,* That the following sections be, and they are hereby, added to Article 72 of the Code of Public General Laws, title "Oysters." * * *

SEC. 86. The Board of Shell Fish Commissioners shall, as soon as practicable after the passage of this Act, cause to be made a true and accurate survey of the natural oyster beds, bars and rocks of this State, said survey to be made with reference to fixed and permanent objects on the shore, giving courses and distances, to be fully described and set out in a written report of said survey, as hereinafter required. A true and accurate delineation of the same shall be made on copies of published maps and charts of the United States coast and geodetic survey, which said copies shall be filed in the office of the said commissioners in the city of Annapolis; and the said commissioners shall further cause to be

delineated upon copies of the published maps and charts of the United States coast and geodetic survey, of the largest scale, one copy for each of the counties of this State in the waters of which there are natural oyster beds, bars and rocks, all natural beds, bars and rocks lying within the waters of such county, which maps shall be filed in the offices of the clerks of the Circuit Court for the respective counties wherein the grounds so designated may lie. * * *

SEC. 87. The Governor of this State is hereby requested to ask the assistance of the United States coast and geodetic survey, and of the United States Fish Commissioner, to aid in the carrying out of the provisions of the preceding section.

* * * * *

SEC. 89. As soon as practicable after the first day of April, 1906, the said commissioners shall organize, and shall at once proceed, with the assistance of such person or persons as may be detailed by the United States coast and geodetic survey, and the United States Fish Commissioner, to aid them in their work, and of such persons as may be appointed under the preceding section, to have laid out, surveyed and designated on the said charts, the natural beds and bars, and shall cause to be marked and defined as accurately as practicable, the limits and boundaries of the natural beds, bars and rocks, as established by said survey, and they shall take true and accurate notes of said survey in writing, and make an accurate report of said survey, setting forth such a description of landmarks as may be necessary to enable the said board, or their successors, to find and ascertain the boundary lines of the said natural oyster beds, bars and rocks, as shown by a delineation on the maps and charts provided in this Act; said report shall be completed and filed in the office of the board in the city of Annapolis within ninety days after the completion of the survey of any county. Said commissioners shall cause the same to be published in pamphlet form, and transmit copies of the same to the clerks of the Circuit Court for the respective counties, where the charts have been filed or directed to be filed as hereinafter provided; the said report to be filed by the clerks of the several counties in a book kept for that purpose. And the said survey and report, when filed, subject to the right of appeal hereafter provided for in this Act, shall be taken in all of the courts of this State as conclusive evidence of the boundaries and limits of all natural oyster beds, bars and rocks, lying within the waters of the county wherein such survey and report are filed, and shall be construed to mean in all of the said courts that there are no natural oyster beds, bars or rocks lying within the waters of the counties wherein such report and survey are filed, other than those embraced in the survey authorized by this Act, and that all areas of the Chesapeake Bay and its tributaries within the State of Maryland, not shown in the survey to be natural oyster beds, bars or rocks shall be construed in all the courts of the State to be barren bottoms, and open for disposal by the State for the purpose of private planting or propagation of oysters thereon under the provisions of this Act; provided, that the said survey and report shall not be construed as to affect in any manner the holdings by citizens of this State in any lot which may have been appropriated or taken up under the laws of this State prior to the approval of this Act.

The law of the State of Maryland, passed March 9, 1842, authorizing officers of the United States Coast and Geodetic Survey to enter upon the lands within the State limits for the purposes of the Survey, is as follows:

AN ACT Concerning the Survey of the Coast of Maryland.

SECTION 1. *Be it enacted by the General Assembly of Maryland,* That it shall and may be lawful for any person or persons employed under and by virtue of an act of the Congress of the United States, * * * at any time hereafter to enter upon lands within this State for the purpose of exploring, surveying, triangulating, or levelling, or doing any other matter or thing which may be necessary to effect the objects of said act, and to erect any works, stations, buildings, or appendages requisite for that purpose, doing no unnecessary injury to private or other property.

SEC. 2.^a *And be it enacted,* That in case the person or persons employed under the act of Congress aforesaid, can not agree with the owners or possessors of the land so entered upon and used as to the

^a Under the rulings of the Comptroller of the Treasury no damages can be collected except through the United States Court of Claims unless an agreement has been made in advance.

amount of damage done thereto by reason of the removal of fences, cutting of trees or injury to the crop or crops growing on the same, it shall and may be lawful for the said parties or either of them to apply to the chief justice for the time being or one of the associate judges of the judicial district in which such land may be situated, who shall thereupon appoint three disinterested and judicious freeholders, residents of the same judicial district, to proceed with as much despatch as possible to the examination of the matter in question, and the faithful assessment of the damages sustained by the owners or possessors aforesaid, and the said freeholders or a majority of them, having first taken and subscribed an oath or affirmation before the chief or associate justice aforesaid or other person duly authorized to administer the same, that they will well and truly examine and assess as aforesaid, and having given five days' notice to both parties of the time of their meeting, shall proceed to the spot, and then and there upon their own view and if required, upon the evidence of witnesses, (to be by them sworn or affirmed and examined) shall assess the said damages, and shall afterward make report thereof and of their proceedings in writing under their hands and seals and file the same within five days thereafter in the office of the clerk of the county in which the land aforesaid is situated, subject to an appeal by either party to the county court of the said county within ten days after filing as aforesaid, and the said report so made as aforesaid if no appeal as aforesaid be taken, shall be held to be final and conclusive as between the said parties, and the amount so assessed and reported shall be paid to the said owners or possessors of the land so damaged within twenty days after the filing of said report, and the said chief or associate justice as aforesaid, shall have authority to tax and allow upon the filing of said report, such costs, fees and expenses to the said freeholders for the performance of their duty as he shall think equitable and just, which allowance shall be paid by the person or persons employed under the act of congress aforesaid, within the time last above limited, but if an appeal as aforesaid be taken, the case shall be set down for hearing at the first term of county court aforesaid, ensuing upon and after appeal, and it shall be lawful for either party immediately after the entry of such appeal, to take out summons for such witnesses as may be necessary to be examined upon the hearing aforesaid, and the said court shall have power in its discretion to award costs against which ever the final judgment shall be entered, and such appeal at the option of either party may and shall be heard before and the damage assessed by a jury of twelve men to be taken from the regular panel and elected as in other cases.

SEC. 3. *And be it enacted*, That if any person or persons shall wilfully injure or deface or remove any signal, monument or building or any appendage thereto, erected, used or constructed under and by virtue of the act of congress aforesaid, such person or persons so offending shall severally forfeit and pay the sum of fifty dollars with costs of suit to be sued for and recovered by any person who shall first prosecute the same before any justice of the peace of the county where the person so offending may reside, and shall also be liable to pay the amount of damages thereby sustained, to be recovered with costs of suit in an action on the case, in the name and for the use of the United States of America, in any court of competent jurisdiction.

APPENDIX B.—THE HAMAN OYSTER CULTURE LAW.

[Extract from Second Report of Shell Fish Commission.]

OBJECT.

"The legislature in placing chapter 711 of the acts of 1906, better known as the Haman Oyster Culture Law, upon the statute books of Maryland had a twofold object in view:

1. To *encourage* an industry in oyster culture upon the *barren bottoms* beneath the tidewaters of the State.
2. To *prevent* the leasing of *natural oyster bars* for the purpose of oyster culture."

SURVEY.

"To make the leasing of barren bottoms possible and the leasing of natural bars impossible, provision was made for a survey of the natural bars for the purpose of accurately locating and marking the same. It was definitely provided that no barren bottoms should be leased in any part of the State until the natural bars of that region had been surveyed, charted, and marked with buoys."

DEFINITION OF A NATURAL OYSTER BAR.

NATURAL BAR NOT DEFINED.

"The Shell Fish Commission is instructed by section 90 of the Haman Oyster Culture Law to exercise its judgment liberally in favor of the natural bars when surveying, charting and buoying them, but other than this the Commission is uninstructed in this important matter. The responsibility of defining a natural bar is placed upon the Commission."

DIVERSITY OF OPINION.

"No definition of a natural oyster bar could be formulated by any man or body of men which would meet with the approval of all parties concerned. Oystermen, as a rule, hold that all bottoms where oysters grow or have grown naturally even though now practically barren of oysters should be considered natural bars. Other citizens of the State who are not directly interested in the oyster business, but interested in the oyster industry from the standpoint of revenue, hold, as a rule, that no bottoms should be excluded from leasing for oyster culture which, by methods known to oyster culturists, may be made to yield a greater number of oysters than they now produce."

"It should be evident to every one that neither of these definitions could be adopted by the Commission as a working basis for determining which of the grounds surveyed are natural oyster bars."

THE GOLDSBOROUGH DEFINITION.

The definition of a natural oyster bar which very nearly approaches a reasonable and satisfactory compromise between the views of the subject held by *oystermen* on one hand and by *oyster culturists* on the other is that contained in an opinion rendered by Judge Charles F. Goldsborough in the circuit court for Dorchester County in the July term, 1881, in the case of William T. Windsor and George R. Todd v. Job T. Moore.

This definition has been adopted by the Shell Fish Commission as the basis for the determination of the status of the various oyster bottoms surveyed and is as follows:

What then is a natural bar or bed of oysters? It would be a palpable absurdity for the State to attempt to promote the propagation and growth of oysters and to encourage its citizens, by a grant of land, to engage in their culture, if the lands authorized to be taken up were only those upon which oysters do not and can not be made to grow. That there may be lands covered by water in the State where no oysters can be found, but where, if planted, they could be cultivated successfully, may be possible, but, if so, I imagine that their extent must be too limited for them to be of much practical, general advantage for the purposes of such a law as the one under discussion; but there are thousands of acres of hard and shifting sands where oysters not only are not found, but where it would be folly to plant them; and these latter it can not be supposed that the State intended to offer to give away, for the simple reason that the State could not help knowing that nobody would have them.

Upon the other hand there are large and numerous tracts where oysters of natural growth may be found in moderate numbers, but not in quantities sufficient to make it profitable to catch them, and yet where oysters may be successfully planted and propagated. In my opinion these can not be called natural bars or beds of oysters, within the meaning of the Act of Assembly, and it is just such lands as these that the State meant to allow to be taken up under the provisions of the above-mentioned section of the Act.

But there is still another class of lands where oysters grow naturally and in large quantities and to which the public are now and have been for many years in the habit of resorting with a view to earning a livelihood by catching this natural growth, and here, I think, is the true test of the whole question. Land can not be said to be a natural oyster bar or bed merely because oysters are scattered here and there upon it, and because if planted they will readily live and thrive there; but whenever the natural growth is so thick and abundant that the public resort to it for a livelihood, it is a natural oyster bar or bed and comes within the above-quoted restriction in the law, and can not be located or appropriated by any individual.

APPLICATION OF DEFINITION.

Before this definition may be of use in determining, accurately and scientifically, the status of an oyster ground, its central idea, "livelihood," must be expanded into accurately determinable factors, and these factors must be combined into a practical scheme of investigating the condition of the ground under consideration.

Stated briefly, a *livelihood* is represented by a *sum of money* obtained from the sale, at a fixed *price*, of a certain *quantity of oysters* gathered in a given *time* from an allotted *area* of ground.

Knowing the value of each of these factors it becomes possible to calculate the number of oysters an oyster ground must produce per square yard in order that oystermen may secure a livelihood by working upon it.

NOTE.—The factors into which the Commission resolved the livelihood problem, the value assigned to each factor, and the scheme devised for practical use in examining and applying the definition to oyster bottoms are given in outline in their Second Report under the heading of the preceding extract, and in detail in their First Report on pages 32 to 69.

APPENDIX C.—SUMMARY OF THE PARTICULAR SURVEYING OPERATIONS WHICH CONSTITUTE AN "OYSTER SURVEY" AS NOW BEING CARRIED ON IN MARYLAND.

Explanation.—A brief account of the particular surveying operations which constitute an "oyster survey" as now being carried on in Maryland will assist in the interpretation of records contained in the technical part of this report, and will be of interest to many who may not understand the necessity for the great amount of work being done or its complicated character.

To those familiar with methods used in surveying and charting the characteristic features of large bodies of water there is an evident necessity for the various operations performed, especially when it is known that the boundaries of the public oyster bars and of the private lots leased for purposes of oyster culture must be surveyed and charted with the greatest practical accuracy. To others it will be sufficient to state that the actual experience gained from oyster surveys in other States has proven that in order to avoid endless dissatisfaction and litigation it is necessary to accurately locate and permanently establish oyster boundaries as is now being done in Maryland.

Triangulation survey.—Such refinement of survey work as that demanded by the conditions of an oyster survey when carried on at considerable distances offshore can only be obtained by the use of a system of triangulation as a frame work or foundation. Therefore, a triangulation survey including the permanent marking of the positions of landmarks with monuments and a record of the descriptions of their locations for future recovery is a necessary operation of a complete oyster survey.

Topographic survey.—The technical records which establish the relation between the offshore oyster boundaries and triangulation landmarks are sufficient for the requirements of engineers in making resurveys, but do not supply the needs of others who are interested in the same boundaries by reason of their occupation as oystermen concerned as to the public oyster bars, or oyster culturists concerned as to the leasable bottoms. For these it is necessary to have the charts of the survey show the relation of the shore line and other topographic features to the boundaries of the public oyster bars and private oyster farms. Therefore, a topographic survey is a necessary operation of a complete oyster survey.

Hydrographic survey.—In the settlement of the important question of what is, or what is not, a natural oyster bar, and in the consideration of bottoms to be selected for purposes of oyster culture, information as to the depth of water and the character of the bottom is required. Therefore, a hydrographic survey is a necessary operation of a complete oyster survey.

Necessary foundation for an oyster survey.—Consequently, the necessary components of a satisfactory foundation for a complete oyster survey are the three classes of survey operations technically named triangulation, topography, and hydrography, or, stated in another way, the foundation of a practical oyster survey includes the surveying operations usually followed by the Coast and Geodetic Survey leading up to the preparation and publication of nautical charts.

Special surveys and investigations pertaining to oysters.—Having obtained this cartographic survey for a foundation, partly by new work and partly from records of previous work of the Government, the combined operations^a making up an "oyster survey" are completed by superimposing on this foundation special surveys and investigations pertaining particularly to oysters or other shell fish.

The special surveys pertaining to oysters furnish information as to the location and outline of oyster-shell bottoms, and are carried on by the sounding boat party in addition to the usual hydrographic work.^b This operation consists of the observation and record of the character of vibration of a wire and chain apparatus which is dragged over the bottom, the vibrations or lack of vibrations indicating the presence and quantity of shells or absence of shells.

^a See Appendix D of this publication for "Statistics of results of combined operations of the Government and State."

^b See pages 104 to 123 of "First Annual Report of Maryland Shell Fish Commission."

The special oyster investigations^a consist of the actual determination of the kind and quantity of oysters on the bottom, and such economic and biological studies of the supply of oyster food, density of water, character of the bottom, and other important matters as affect the growth of oysters. In this work the oyster investigation stations are located and buoyed by the hydrographic party while engaged in the survey of the oyster-shell limits. They are selected with the view of obtaining characteristic data which can be used for the interpretation of the recorded vibrations of the chain apparatus at all other points covered by the survey.

Preparation of results.—The actual surveying operations and oyster investigations having been completed for any one county, there still remains technical work of nearly equal magnitude to that described.^b This work consists of the preparation of charts and technical descriptions of boundaries and landmarks for publication by the Government, the preparation of that part of the annual report of the Commission covering the special oyster surveys and investigations, the making of the leasing charts and finished projections, and finally the filing of the oyster charts and records with the courts and the Commission, thus opening a county for oyster culture.

Summary.—From the foregoing account it can be seen that a complete oyster survey properly conducted so as to answer all practical requirements of the present and permanency of results for the future is a very complicated affair, involving many lines of surveying and other scientific work, and requiring the professional services of experts in the various operations of cartographic surveying and shell-fish investigations.

APPENDIX D.—STATISTICS OF RESULTS OF THE COMBINED OYSTER SURVEY OPERATIONS OF THE GOVERNMENT AND STATE.^c

Operations	Anne Arundel County ^d	Somerset County ^d	Wicomico County ^d	Worcester County ^d	Total
Natural oyster bars surveyed and delineated	91	37	15	28	171
Acres of natural oyster bars	33,666	27,566	2,038	1,655	64,925
Crab bottoms surveyed and delineated		54			54
Acres of crab bottoms		32,108			32,108
Clam beds surveyed and delineated		3			3
Acres of clam beds		506			506
Boundary buoys located and planted	362	154	53	108	677
Triangulation landmarks established	123	86	30	48	287
Miles of shore line covered by triangulation	110	125	46	95	376
Square miles of water covered by triangulation	220	375	44	110	749
Miles of examination of shell bottom with chain apparatus	369	296	58	63	786
Oyster investigation stations occupied	440	679	162	147	1,428
Tide stations established	4	3	1	1	9
Number of soundings over shell bottoms	37,049	17,904	3,387	3,649	61,989
Square miles covered by soundings and chain apparatus	58	47	3	3	111
Projections prepared and plotted	9	13	2	5	29
Leasing charts prepared	13	12	2	3	30
Oyster charts published	4	6	2	3	15
Reports published	2	2	2	2	8
Progress maps published	2	2	2	2	8

^a See pages 30 to 67 and 129 to 199 of "First Annual Report of Maryland Shell Fish Commission."

^b No mention is made here of the large amount of administrative work of the Commission, which is greatly complicated and increased by the effect of the oyster-survey operations on many thousands of people whose interests are more or less involved, or of the large amount of survey work involved in the survey and record of the boundaries of oyster lots leased from the State by private individuals for the purposes of oyster culture.

^c These statistics do not include the large amount of triangulation, topography, and hydrography resulting from previous work of the Coast and Geodetic Survey which was utilized in the preparation of the published oyster charts and records.

^d Work in Calvert, St. Marys, and Charles counties has been finished, but final statistics of results will not be published until these counties are opened for oyster culture.

^e Total area of natural oyster bars of Connecticut is 5,770 acres.

^f Less quantities covered by statistics of more than one county.

THE NORRIS PETERS CO., WASHINGTON, D. C.

COAST AND GEODETIC SURVEY

PROGRESS MAP
WORCESTER COUNTY
MARYLAND

To accompany report of work of United States
Coast and Geodetic Survey in cooperation
with the Maryland Shell Fish Commission

1907-1908

CHART No. 13

CHART No. 14

CHART No. 15

• Landmarks (Coast Survey Triangulation Stations)

— MARYLAND-VIRGINIA Boundary Line

— Limits of projections on file at Washington

— Limits of charts published by Coast and Geodetic Survey

Scale: 100,000

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