DEPARTMENT OF COMMERCE AND LABOR
COAST AND GEODETIC SURVEY
O. H. TITTMANN, Superintendent

SURVEY OF OYSTER BARS

WICOMICO COUNTY
MARYLAND

DESCRIPTION OF BOUNDARIES AND LANDMARKS AND REPORT OF WORK OF UNITED STATES COAST AND GEODETIC SURVEY 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
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LETTER OF SUBMITTAL.

DEPARTMENT OF COMMERCE AND LABOR,
COAST AND GEODETIC SURVEY,
Washington, November 12, 1908.

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. OSCAR S. STRAUS,
Secretary of Commerce and Labor.

CERTIFICATION.

ANNAPOLIS, MD., *November 10, 1908.*

The following publication is certified to contain correct technical descriptions of all boundaries and landmarks established in the waters of Wicomico 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., *November 10, 1908.*

Examined and certified to be correct.

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

NOTE.—As required by law, certified copies of this publication and of the charts of the natural oyster bars of "Wicomico County and Adjacent Waters" were filed in the office of the clerk of the circuit court of Wicomico County and in the office of the Board of Shell Fish Commissioners, at Annapolis, on December 1, 1908.

CONTENTS.

SURVEY OF OYSTER BARS, WICOMICO 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 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.[b] 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[c] 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.

The part prepared and issued by the State under the direction of the Shell Fish Commission consists of an annual report[d] of all the operations of the Commission performed under the provisions of the laws of Maryland,[e] including results of biological

[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] 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, and Wicomico counties. Those for Worcester, Calvert, St. Marys, and Charles counties are now being prepared.

[c] See page 13 and the progress map attached to this publication.

[d] These reports can be obtained by application to the Shell Fish Commission, Annapolis, Md. They are issued annually in October, and the first report is now available for distribution.

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

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.

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 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.[a] 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 REMARKS.

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

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

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 attainable 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.

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.

The technical records which established 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 barren 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.

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.

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.

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 C 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.

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 record and publication by the Government, the manufacture and planting of "State buoys" at all corners of the oyster-bar boundaries, the preparation of that part of the annual report of the Commission covering the oyster investigations, the making of the leasing charts and finished projections, and finally the survey and record of the boundaries of oyster lots leased from the State by private individuals for the purposes of oyster culture.

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.

[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 economic and political effect of the oyster-survey operations on many thousands of people whose interests are more or less involved.

REPORT OF THE WORK OF THE COAST AND GEODETIC SURVEY.

INSTRUCTIONS.

The two following 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, has proved very beneficial to the work, and is 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.

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

[a] For these laws see Appendix A.

field and the preparation for publication of charts and technical records in the Office at Washington.

The equipment for the work of the party has been ample and satisfactory. The large living and office quarters furnished the Government on the Maryland Shell Fish Commission house boat *Oyster* have been very convenient for the work, besides facilitating efficient cooperation with the surveying and oyster investigation parties of the State. In addition to the accommodations on the *Oyster*, the Coast and Geodetic Survey party has had the constant use of the large steam launch *Inspector* and several other boats furnished by its own Service, and the occasional use of the Bureau of Fisheries launch *Canvasback*[a] and the steamer *Governor McLane*[b] of the State fishery force.

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.[c]

On June 20, 1907, the work in connection with the publication of the "Charts of Natural Oyster Bars" and report[d] of "Survey of Oyster Bars" for Anne Arundel County was finally completed and the survey records and reports for that county were ready for filing in the archives of the Survey at Washington.

In addition to this work, a Coast and Geodetic Survey signal-building party was engaged in the erection of triangulation signals in Somerset County from May 2 to June 25 in cooperation with a signal-building party of the Shell Fish Commission.

From June 25 until the practical completion of the field work in Somerset and Wicomico counties on November 6, the usual routine of field and office work was followed without material interruption except that resulting from the moving of the house boat *Oyster* from Crisfield to Manokin River on July 13, then to Piney Island on August 27, and to Wicomico River on August 30, where she remained until her removal to Nanticoke River on September 30, 1907.

From this latter date the work in Wicomico County predominated until the field surveys of that county were completed, when the entire party left by rail for Worcester County, it being impracticable to move the house boat to the waters of that locality.

At the close of the survey work in Worcester County in the last part of December, office work relating to Somerset and Wicomico counties was begun at Baltimore,[e] and was continued without material interruption until March 23, 1908, when a subparty went to Worcester and Somerset counties to finish some details of field work in those sections required for the preparation of the technical reports and oyster charts.

[a] By courtesy of Dr. H. F. Moore, U. S. Bureau of Fisheries.

[b] By courtesy of Capt. James A. Turner, commanding.

[c] The field and office work relating to Somerset County is so intermixed with that of Wicomico County that this statement includes the work of both counties.

[d] See that report for an account of the work from July 3, 1906, to June 20, 1907.

[e] Office rooms were furnished for the work of the Government party in the "old court-house" and afterwards in the new custom-house by courtesy of Hon. William F. Stone, collector of customs.

The very large amount of work of computation and drafting necessary to make the results of the survey of the previous season available for publication was nearly completed on May 2, 1908, when it was transferred to the Government quarters on the house boat *Oyster*, which left Baltimore on the same day with the party and outfit for her anchorage off Solomons Island, in the Patuxent River.

On July 1, 1908, certified copies of the technical report and oyster charts of Somerset County were filed in the office of the clerk of the circuit court of Somerset County and in the office of the Board of the Shell Fish Commissioners, at Annapolis, thus opening that county for oyster culture on that date.

STATISTICS.[a]

Landmarks and triangulation signals erected	30
Monuments planted to mark triangulation stations	30
Triangulation stations occupied for observations of horizontal angles	32
Old triangulation stations recovered	5
New triangulation stations established	32
Total old and new triangulation stations marked and described	37
Linear miles of shore line covered by triangulation (approximate)	46
Square miles covered by triangulation (approximate)	44
Hydrographic projections prepared and completed as records of oyster boundaries	2
Triangles computed	80
Geographic positions computed	37
Corners of oyster boundaries established by computation	56
Back azimuths and distances computed from corners of boundaries to triangulation stations	168
Descriptions of triangulation stations prepared for publication	37
Descriptions of oyster boundaries prepared for publication	15
Total typewritten pages of manuscript prepared for publication of report	115
"Charts of Natural Oyster Bars" prepared for publication	2
Progress map prepared for publication	1

GENERAL STATEMENT.

The results obtained from the work of the Coast and Geodetic Survey in Wicomico County in cooperation with the Bureau of Fisheries and the Maryland Shell Fish Commission need no 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 progress map at the end of this 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 were prepared with all the accuracy permitted by their large scale, especially as to the boundaries of the various

[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 Wicomico 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.

shell-fish bottoms in relation to landmarks, but this accuracy of location on the charts is further added to 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, not only means a better foundation of a great oyster industry by irradicably locating the natural oyster bars for the use of the public, but also a better and more permanent superstructure of oyster culture for the individual by the reason of the integrity of the foundation on which it stands.

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 unfailing 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.

CHARTS AND MAPS.

CHARTS OF NATURAL OYSTER BARS.

The charts[a] of the natural oyster bars of "Wicomico County and Adjacent Waters," published by the Coast and Geodetic Survey from results of surveys of the Government in cooperation with the Maryland Shell Fish Commission, consist of two sheets covering the eastern shore of Nanticoke River and the northern shore of Wicomico River, including all oyster-producing bottoms of Wicomico County. They are published on a scale of 1 part in 20,000 (approximately $3\frac{1}{6}$ inches to a statute mile) and are constructed on polyconic projections and 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 Wicomico 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 headings of "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 details of the inshore topography was obtained from the excellent map of Wicomico 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. Four curves were selected as being the most convenient for taking off from the original hydrographic sheets and the ones of greatest value to those interested in shell-fish industries. The 1-fathom contour (6 feet) corresponds in a general way to the outer limits of the crab bottoms, while the waters outside of this curve and inside the 5-fathom contour (30 feet) practically include all the oyster bars surveyed. The 3-fathom contour (18 feet) furnishes the curve of about the average depth of water on the oyster bars and the 10-fathom contour (60 feet) serves in a general way to indicate the outer limits of probable oyster culture.

The boundaries of the waters within the "territorial limits of the county" opened up for the leasing with Wicomico 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 and are usually located within the boundaries of the different areas.

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 Wicomico County, like those for Anne Arundel and Somerset counties, have been prepared under the direction of the hydrographic engineer of the Commission. These charts are constructed on polyconic projections and 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, and Wicomico County 2 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 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 Wicomico County waters are 2 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 Wicomico 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 map[b] accompanying the "First Annual Report of the Maryland Shell Fish Commission" was prepared under the direction of the hydrographic engineer of the Commission. It is on the scale of 1 part in 400,000 and shows 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 of Maryland.

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

[b] This map and report can be obtained by application to Maryland Shell Fish Commission, at 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 Wicomico 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 Wicomico County and the adjacent counties of Dorchester and Somerset; therefore technically all waters opened up for leasing with Wicomico 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 Wicomico County; 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 OF DESCRIPTIONS OF LANDMARKS.

The oyster laws of Maryland authorizing the surveys 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 locations of landmarks in a uniform and logical manner. The descriptions start with the assumption that the individual seeking to find a landmark has only an indefinite idea of its location. They then gradually proceed from general descriptions of the surroundings of a landmark to the specific details of the character of the center and reference markings. An examination of the descriptions themselves will best indicate the method followed.

The heading of each description is the name by which the landmark or triangulation station is known and designated in all work and records of the Government and State.

Under the heading of "Locality" the first paragraph gives a description of the general locality of the landmark and the serial number of the published "Chart of Oyster Bars" of Maryland which best shows its location. The published charts are on the large scale of 1 part in 20,000, and show the location of the triangulation stations so clearly that in many cases the written descriptions will not be required to find them.

Under the same heading of "Locality" the second paragraph furnishes the description of the immediate locality of the landmark and refers to the bearing and distance of standard cement monument marking the reference station, as it is the first object that is likely to catch the eye when the immediate vicinity of the desired station is reached.

Under the heading of "Marks" a description is given of the character of the markings of the "observed station" and the reference station. It will be noted that, although

the "observed station" is the one "occupied" and "observed on" for horizontal angles, and also the one whose geographic position is computed, 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 these stations on edges of banks and ends of points of land, which in Chesapeake Bay and tributaries generally means that 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 necessity of reference marks, if the frequent reestablishment of a new framework of triangulation is to be avoided.

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.

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.

It is the expectation that the reference stations,[a] the character of which is explained above, will be used in many cases in the near future in the place of the "observed stations." This has been made possible by the careful measurements of direction and distance of these stations from the "observed station," which are recorded under the heading of "References."

Under the heading of "References" are given the directions and distances of 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. Its direction is taken as being 0° 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 parenthesis alongside the name. This furnishes means for the calculation of the bearings of any of the other

[a] To obtain the geographic positions of any of the "observed stations" or of the "reference stations," application should be made to the Superintendent of the Coast and Geodetic Survey at Washington, D. C.

[b] The mean magnetic variation for Wicomico County is 5° 45′ west of north 1908) and is increasing at the rate of 3′ yearly.

reference objects for the purposes of locating a station by compass bearings or for the relocation of corner buoys of oyster-bar boundaries by the method of horizontal angles described in this publication under the heading of "Boundaries of oyster bars."

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 direction with which they are recorded.

DESCRIPTIONS OF TRIANGULATION STATIONS.

COW.

Locality.—Western shore Nanticoke River on Mink Point about ¼ mile east of entrance to Cow Creek. See Charts Nos. 11 and 12.)

Observed station is on a very soft marsh point at the outer edge of water bushes about 5 yards back from the shore to the east, 15 yards from extreme end of point to the southeast, and 15 yards from the shore to the southwest. No permanent reference objects near station. Cement monument marking reference station is 8.68 meters northwest of observed station.

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

References.—

	°	′	″	
"Frog" (S 6° 13′ W)	0	00	00	2 miles.
A shanty	37	16	--	¾ mile.
REFERENCE STATION	129	19	20	8.68 meters
White shanty	189	53	--	1 mile.
A shanty	209	52	--	½ mile.
Tangent of land	217	43	--	½ mile.
Large red roof greenhouse	236	48	--	2½ miles.
Windmill	243	52	--	2¾ miles.
Gambrel of house	244	13	--	2½ miles.
Chimney of large greenhouse	254	24	--	2¼ miles.
Canning house stack	257	28	--	1¾ miles.
Canning house stack	275	26	--	1½ miles.
Near corner of Nanticoke wharf	284	49	--	1¼ miles.
Large red roof white house	297	32	--	2½ miles.
Large red roof white house	299	24	--	2½ miles.
Right tangent of Nanticoke woods	310	15	--	3 miles.
Left tangent of Sandy Point	341	48	--	1½ miles.

OKAY.

Locality.—Western shore of Nanticoke River about ⅛ mile south of Swan Creek Cove on Marsh Point. (See Chart No. 11.)

Observed station is on marsh land about 2 feet above and 10 yards back from high-water mark. A shanty known as Insleys watch house stands about 35 yards north of observed station. No other permanent reference objects near station.

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

References.—

	°	′	″	
Bivalve Church (N 84° 32′ E)	0	00	00	2½ miles.
Chimney of red roof house	20	38	--	2½ miles.
Windmill tower	46	41	--	2½ miles.
Tangent of land	92	23	--	1¼ miles.

References—Continued.	°	′	″		
Tangent of land	105	45	--	------	150 yards.
Left side of watch house	249	17	--	------	35 yards.
Right side of watch house	258	17	--	------	35 yards.
Space between chimneys of large white house	340	43	--	------	3¾ miles.
Tangent of Bivalve wharf	355	31	--	------	2¾ miles.
Stack of canning house	359	12	--	------	2¼ miles.

AR.

Locality.—Western shore of Nanticoke River about 1½ miles northwest by west of Bivalve wharf. (See Chart No. 11.)

Observed station is on marsh land between two small creeks about 40 yards back from high-water mark. It is about 43 yards northwest of the mouth of one creek, and 35 yards west-southwest of mouth of the other creek. No permanent objects near station.

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

References.—	°	′	″		
"Nanticoke Church" (S 13° 34′ E)	0	00	00	------	3¾ miles.
Right edge Sandy Point woods	23	58	--	------	4 miles.
Smoke pipe of cabin near "Okay"	42	57	--	------	1½ miles.
Chimney on house	46	26	--	------	½ mile.
Left tangent of first woods	81	20	--	------	2¾ miles.
Left tangent of long thick woods	98	53	--	------	1 mile.
Left edge short thick woods	134	11	--	------	1 mile.
Chimney of red roof cabin	247	47	--	------	½ mile.
Houses with several gables	262	18	--	------	3 miles.
Right edge Wetipquin woods	274	37	--	------	2¼ miles.
Chimney of house behind trees	302	43	--	------	2 miles.
Windmill	319	03	--	------	2 miles.
Stack of canning house	320	15	--	------	2 miles.
Chimney of house on Ragged Point	350	33	--	------	2¼ miles.
Windmill	352	57	--	------	3¼ miles.

GOVER.

Locality.—Northwestern shore of Nanticoke River 1¾ miles west-northwest of entrance to Wetipquin Creek and ⅛ mile north of cove named Perch Haul. See Chart No. 11.)

Observed station is on a point of marsh covered with grass and water bushes, and is about 15 yards northwest from extreme end of point. A shanty stands among the bushes and small trees about 200 yards to the west-southwest. A clump of about 50 pine trees stands about ¼ mile west and another clump stands about ¼ mile northwest.

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

References.—	°	′	″		
Bivalve Church (S 21° 30′ E)	0	00	00	------	2¾ miles.
Tangent of land	35	24	--	------	1 mile.
Left side of opening in woods	72	06	--	------	2 miles.
Two pine trees together	83	07	--	------	¾ mile.
Center of shanty	98	26	--	------	200 yards.
Clump of pine trees	123	56	--	------	¼ mile.
Clump of pine trees	176	20	--	------	¼ mile.
Inside edge of cove	201	45	--	------	100 yards.
Clump of small pine trees	255	31	--	------	¾ mile.
Tangent to point of land	269	35	--	------	1½ miles.
Left tangent of Sandy Hill wharf	276	02	--	------	3 miles.
Large house	286	27	--	------	3¼ miles.
Left edge of pine woods near Wetipquin Creek	328	13	--	------	2 miles.

STREETT.

Locality.—Northwestern shore of Nanticoke River on point on southwest side of entrance to Jacks Creek. (See Chart No. 11.)

Observed station is on a marsh and grass point 7 yards west from its extreme end and about 4 yards from each side of point to north and south. Cement monument marking reference station is 11.89 meters west of observed station.

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

References.—	°	′	″		
"Earle" S 45° 01′ E)	0	00	00	------	1 mile.
A shanty	0	41	--	------	1 mile.
Large white house with red roof	27	08	--	------	2¼ miles.
Canning-house stack at Tyaskin	33	42	--	------	1¾ miles.
Large white building	36	42	--	------	1¾ miles.
Point of marsh	47	33	--	------	100 yards.
First of four trees	135	01	--	------	½ mile.
REFERENCE STATION	164	39	00	------	11.89 meters.
Point of marsh	255	02½	--	------	30 yards.
House on the other side of Jacks Creek	258	13	--	------	⅛ mile.
Left tangent of Sandy Hill wharf	309	38	--	------	1¼ miles.
White house	318	08	--	------	1½ miles.

EARLE.

Locality.—Southeast shore of Nanticoke River about one mile below Sandy Hill wharf. (See Chart No. 11.)

Observed station is on sand and grass land between river and pine grove, and about 80 yards back and 5 feet above high-water mark. A white oak tree about 2½ feet in diameter stands between station and river and another and larger white oak tree stands about 15 yards to the northeast. There is a shanty about 20 yards to the west and a sand beach northwest of the station.

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

References.—	°	′	″		
"Juliet" (S 41° 05′ W)	0	00	00	------	1¼ miles.
Nail in blaze in white oak tree (2½ feet in diameter)	88	44	30	------	13.98 meters.
Nail in blaze in pine tree	160	39	00	------	19.05 meters.
Nail in blaze in oak tree (2½ feet in diameter)	196	35	40	------	13.95 meters.
Nail in blaze in pine tree	326	01	00	------	15.76 meters.
Right tangent of woods on other side of Wetipquin Creek	358	52	--	------	1½ miles.

JULIET.

Locality.—Eastern shore of Nanticoke River on point on southwest side of entrance to Wetipquin Creek. (See Chart No. 11.)

Observed station is on sand and marsh point about 100 yards southwest of entrance to Wetipquin Creek. It is about 10 yards back from high-water mark and about 5 yards outside of several small pine trees. Very dense pine woods stand about 100 yards to the south of the station.

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

References.—	°	′	″		
"Earle" (N 41° 04′ E)	0	00	00	------	1¼ miles.
Nail in blaze in pine tree	29	41	30	------	4.92 meters.
Near point of roof of oyster house	40	05	--	------	300 yards.
Left edge of woods	64	21	--	------	200 yards.

References—Continued.

	°	′	″	
Nail in blaze in pine tree	71	17	00	6.31 meters.
Nail in blaze in pine tree	98	20	00	6.88 meters.
Right edge of woods	163	52	--	200 yards.
Right tangent of Bivalve wharf	170	02	--	1½ miles.
Two-story white house	210	06	--	2¼ miles.
Two-story white house with red roof	228	37	--	¾ mile.
Opening in woods	230	16	--	3 miles.
Gray house at Jacks Creek	324	00	--	1¾ miles.
Tangent of land	345	58	--	150 yards.
Tangent of land	354	49	--	150 yards.

POLE.

Locality.—Eastern shore of Nanticoke River on wharf off town of Bivalve, located about 1¼ miles northeast of Ragged Point. (See Chart No. 11.)

Marks.—Observed station is flagpole on western peak of a house on wharf at Bivalve about 300 yards from shore.

References.—None necessary.

BIVALVE CHURCH.

Locality.—Eastern shore of Nanticoke River about ⅜ mile back from shore in town of Bivalve on main road leading to the steamer landing. (See Chart No. 11.)

Marks.—Observed station s center of steeple on Bivalve Methodist Church.

References.—None necessary.

RAG.

Locality.—Eastern shore of Nanticoke River on northern side Ragged Point. (See Chart No. 11.)

Observed station is on a sandy point about 25 yards back from high-water mark and 100 yards northeast from extreme end of point. A grove of pine trees stands about 50 yards to the east and two groups of pine trees about 20 and 75 yards to the northeast. Two pine trees each 15 inches in diameter and 2½ feet apart stand about 20 yards to the east of the station.

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

References.—

	°	′	″	
Nanticoke Church (S 1° 46′ E)	0	00	00	1¼ miles.
Left end of Sandy Point	29	17	--	3½ miles.
Chimney on house near "Cow"	51	48	--	2½ miles.
Large tree at left end of woods	130	20	--	3¼ miles
Left one of two trees (opposite shore)	169	56	--	3¾ miles.
Flag pole on Bivalve wharf	201	11	--	1¾ miles.
Smoke pipe on Bivalve wharf house	207	14	--	1¾ miles.
Nail in stump of limb on pine tree	218	35	--	32.78 meters.
Nail in blaze in double pine tree	258	01	--	19.66 meters.
Nail in blaze in large pine tree	293	26	--	43.19 meters.
Chimney on a white house	303	29	--	135 yards.
Windmill near large house	344	13	--	¾ mile.
Steeple on a barn	356	40	--	1 mile.
Large chimney on large flat-roof house	357	10	--	1 mile.

NANTICOKE CHURCH.

Locality.—Eastern shore of Nanticoke River in town of Nanticoke, about ¼ mile back from river and ¾ mile northeast of Roaring Point. (See Charts Nos. 11 and 12.)

Marks.—Observed station is center point of spire of church known as "Nanticoke Methodist Episcopal Church."

References.—None necessary.

CRAB.

Locality.—Upper end and western shore of Tangier Sound on eastern side of Bloodsworth Island about 2⅝ miles southeast of Sharkfin Shoal Light and about halfway between Piney Island Cove to north and Great Cove to south. (See Chart No. 12.)

Observed station is about 15 yards from high-water mark to the northeast and about 35 yards from the shore to the east. A small flat-roof crab house stands about 80 yards to the north-northeast and another crab house about twice the distance in the same direction.

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

References.—

	°	′	″	
"Sharkfin Shoal Light" (N 45° 25′ E)	0	00	00	2⅝ miles.
Left end of large white house near Stump Point	6	11	--	7⅞ miles.
End of roof of white house on bluff	31	36	--	6¼ miles.
End of Deal Island wharf	53	03	--	3¾ miles.
Large white house near red roof house	72	35	--	4¼ miles.
Aspen tree near "Joshua"	88	06	--	5⅛ miles
Tall pine tree	165	00	--	1½ miles.
Near end of flat-roof shanty	288	32	--	80 yards.
Flag pole on Brown's crab house	299	01	--	150 yards.

SHARKFIN SHOAL LIGHT.

Locality.—Northern end of Tangier Sound about equally distant from entrances of Hooper Strait, Fishing Bay, and Nanticoke River. (See Chart No. 12.)

Marks.—Observed station is center point of black lantern on hexagonal screw pile known as "Sharkfin Shoal Light."

References.—

"Great Shoals Light" (N 81° 45′ E) ---------- 5⅞ miles.

HEAD.

Locality.—Upper end of Tangier Sound, on southern part of peninsula known as "Bishops Head," situated between Hooper Strait and Fishing Bay. (See Chart No. 12.)

Observed station is on eastern side of marsh land about ½ mile north of extreme southerly end of Bishops Head and about 15 yards east of two crab houses. It is about 15 yards southwest of high-water mark, behind water bushes which skirt the shore. Cement monument marking reference station is 13.41 meters west from observed station.

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

References.—

	°	′	″	
"Sharkfin Shoal Light" (S 60° 41′ E)	0	00	00	2¾ miles.
Crab-house flagstaff	50	30	--	3¼ miles.
Large pine	97	42	--	2 miles.
REFERENCE STATION	139	55	40	13.41 meters.
Near gable of 2½-story white house	140	24	--	¼ mile.
Chimney on white house	156	44	--	⅛ mile.
Left side of crab house	166	38	--	17.31 meters.
Right side of crab house	199	54	--	16.11 meters.
Chimney on yellow house	208	28	--	1½ miles.
Chimney on end of white house	238	53	--	3 miles.
Right side of Nanticoke Point woods	326	56	--	7½ miles.

FROG.

Locality.—West shore of mouth of Nanticoke River, on the southeasterly point of Clay Island, known as "Frog Point." (See Chart No. 12.)

Observed station is on a marsh point about 25 yards back from extreme end of point, 20 yards from the east side and 25 yards from the west side. Water bushes abound back of station. There are no permanent reference objects near station. Cement monument marking reference station is 13.10 meters north of observed station.

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

References.—

	°	′	″		
"Sharkfin Shoal Light" (S 41° 25′ W)	0	00	00	------	3⅛ miles.
Left tangent of Clay Island	35	17	--	------	1¼ miles.
REFERENCE STATION	141	45	50	------	13.10 meters.
Right tangent of Sandy Point	177	41	--	------	¾ mile.
Chimney on white house with black roof	179	12	--	------	2¼ miles.
Chimney on near end of large red-roof white house	183	02	--	------	2½ miles.
Stack of canning house	184	36	--	------	2½ miles.
Land end of Nanticoke wharf	184	36	--	------	2½ miles.
End of Nanticoke wharf house	186	00	--	------	2¼ miles.
Chimney on ell end of main part of large red-roof white house	211	27	--	------	2¾ miles.
Right tangent of Nanticoke Point woods	238	44	--	------	2¾ miles.
Large square chimney on white house (Dames Quarter)	264	17	--	------	4 miles.
Rock Creek poplar tree	284	17	--	------	3½ miles.
Flagstaff on Deal Island wharf	322	09	--	------	4¾ miles.

ROAR.

Locality.—Eastern shore of Nanticoke River on point of land known as Roaring Point, and about ¼ mile north from outer end of Roaring Point wharf. (See Chart No. 12.)

Observed station is 30 yards to the east of the extreme end of the point and on a sandy knoll about 5 feet above high-water mark. It is about 20 yards back from high-water mark on the north side and about 40 yards back from high-water mark on south side of the point. Pine woods stand about 150 yards inshore from station.

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

References.—

	°	′	″		
"Frog" (S 39° 02′ W)	0	00	00	------	2½ miles.
Two shanties	19	17	--	------	2 miles.
One shanty	30	20	--	------	1¾ miles.
A shanty	71	32	--	------	1¼ miles.
White shanty	98	53	--	------	1¾ miles.
Barn steeple	117	41	--	------	4½ miles.
White shanty behind "Okay"	121	25	--	------	2¾ miles.
Red roof house	144	42	--	------	7½ miles.
Twin trees on Ragged Point	159	30	--	------	2 miles.
Chimney on white house	175	23	--	------	1½ miles.
Windmill	184	04	--	------	1 mile.
Gambrel roof house	184	32	--	------	1 mile
White canning house stack	195	11	--	------	½ mile.
Land end of wharf	271	58	--	------	¼ mile.
Large house	293	38	--	------	1¼ miles.
Right tangent of Nanticoke Point woods	297	22	--	------	2½ miles.
Right tangent of Nanticoke wharf	304	52	--	------	⅜ mile.
Left tangent of Sandy Point	359	51	--	------	1¾ miles.

NANTI.

Locality.—Eastern side of entrance to Nanticoke River about ½ mile northwest of Nanticoke Point. (See Chart No. 12.)

Observed station is on grassy land about 2 feet above and 20 yards back from high-water mark. It is about midway between edge of woods on Nanticoke Point and unpainted house near poplars ¼ mile to the north.

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

References.—

	°	′	″	
"Sharkfin Shoal Light" (S 65° 14′ W)	0	00	00	5 miles.
Tangent of Sandy Point	51	33	--	2¼ miles.
Left end of Nanticoke wharf	89	45	--	2 miles.
Near chimney of red roof house	96	51	--	¾ mile.
Chimney of unpainted house	101	08	--	¼ mile.
Near chimney of house nearest woods	116	56	--	¼ mile.
Tree high above woods	119	53	--	2½ miles.
Right end of heavy woods	134	03	--	1¼ miles.
Right end of scant woods	147	11	--	¾ mile.
Wild cherry tree	178	24	--	50 yards.
Left end of woods	227	46	--	¼ mile.
Right end of woods	269	45	--	¼ mile.
Poplar tree Dames Quarter	307	28	--	2¾ miles.
Tangent of Haines Point	330	55	--	4½ miles.

WHITE.

Locality.—Eastern shore of entrance to Nanticoke River on western part of Nanticoke Point. (See Chart No. 12.)

Observed station is on a sand and grass point about 2 feet above high-water mark, 3 yards from the west side, 15 yards from the south end, and 20 yards from southeast side. Dense pine woods stand about 100 yards to the northwest, open marsh to the northeast, and a clump of about a dozen pine trees in marsh about ⅜ mile to the northeast. There is a cove about 40 yards east of the station and another point of land about 100 yards to the southeast. Cement monument marking reference station is 16.63 meters north of observed station.

Marks.—Observed station is a nail in a pine stub about 6 inches below surface or ground. Reference station is center point of triangle on standard cement monument.

References.—

	°	′	″	
"Great Shoals Light" (S 44° 16′ E)	0	00	00	1¼ miles.
Poplar tree at Dames Quarter	65	08	--	2½ miles.
Tangent of Hall Point	86	06	--	3¾ miles.
Tangent of Sandy Point	164	17	--	3 miles.
Left end of pine woods	172	27	--	100 yards.
Right end of pine woods	213	21	--	150 yards.
REFERENCE STATION	227	29	00	16.63 meters.
Largest tree in clump of about 12 pines	247	23	--	⅜ mile.
Chimney on cabin on Ellis Point	279	05	--	2 miles.
White house	311	54	--	½ mile.
Point of land	335	02	--	100 yards.

ELLA.

Locality.—North shore of Wicomico River on point at east side of entrance to Ellis Bay. (See Chart No. 12.)

Observed station is on a marsh point about 1 foot above high-water mark. It is about 10 yards back from the shore to the west, 20 yards back from the shore to the south, and 20 yards back from the shore to the north. No permanent reference objects near station.

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

References.—	°	′	″		
"Great Shoals Light" (S 9° 49′ W)	0	00	00	------	2 miles.
Tangent of land on Mollies Point	5	14	--	------	1 mile.
Watch house	26	10	--	------	½ mile.
Left of woods on Nanticoke Point	44	23	--	------	1½ miles.
Right of woods on Nanticoke Point	52	33	--	------	1¼ miles.
Chimney of white house	135	45	--	------	2 miles.
Chimney of gray house	142	43	--	------	2 miles.
Chimney of white house	249	27	--	------	200 yards.
Mount Vernon Church	257	58	--	------	2¼ miles.
Chimney on middle of white house	274	28	--	------	1¼ miles.
Chimney on cream and brown house	290	49	--	------	1 mile.
Chimney on brown house	291	03	--	------	1 mile.
Smoke pipe of watch house	306	57	--	------	1 mile.

HOLLAND.

Locality.—North shore of Wicomico River on Holland Point about 1¼ miles west of Mount Vernon Church, and 1¼ miles east of Ellis Bay. (See Chart No. 12.)

Observed station is on a marsh point about 20 yards north of high-water mark on its extreme end and about 100 yards west of a creek. A small cabin stands about 200 yards to the west.

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

References.—	°	′	″		
"Wind" (S 28° 35′ W)	0	00	00	------	1¾ miles.
Great Shoals Light	4	34	--	------	2¾ miles.
Tangent of Mollies Point	18	39	--	------	2 miles.
Left tangent of woods on Nanticoke Point	34	33	--	------	2¾ miles.
Right tangent of woods on Nanticoke Point	39	28	--	------	2¾ miles.
Chimney of house near Ellis Bay	46	19	--	------	1¼ miles.
Chimney of cabin	56	14	--	------	200 yards.
Chimney on left end of large red roof building	91	56	--	------	3 miles.
Large chimney on white house	188	31	--	------	1¼ miles.
Chimney of slate-colored house	230	43	--	------	1¼ miles.
Chimney on middle of light-blue house	240	48	--	------	1 mile.
Chimney on 2½-story light-green house	266	41	--	------	¾ mile.
Right chimney on white house	317	29	--	------	½ mile.

CHILD.

Locality.—North shore of Wicomico River about ⅞ mile north of Mount Vernon Church. (See Chart No. 12.)

Observed station is on marsh land about 2 feet above and 15 yards back from high-water mark. There is an old wharf about 300 yards to the east and at a point about 100 yards to the north, two creeks join and form a single creek about 20 feet wide which flows into the river at a point about 15 yards west of observed station.

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

References.—	°	′	″		
"Mount Vernon Church" (S 10° 15′ E)	0	00	00	------	⅞ mile.
Chimney on white house in woods on opposite shore	3	23	--	------	¾ mile.
Chimney on white house on sand bluff on opposite shore	15	32	--	------	⅝ mile.
Smoke pipe on large white house	19	55	--	------	¾ mile.
Chimney on brown house	48	14	--	------	1½ miles.

References—Continued.	°	′	″		
Great Shoals Light	49	33	--	------	3¾ miles.
Tangent of Holland Point	62	44	--	------	1¼ miles.
Fork of creek	183	08	--	------	100 yards.
Chimney of large house	206	39	--	------	2 miles.
Chimney of another large house	238	43	--	------	¾ mile.
Mount Vernon wharf smoke pipe	293	12	--	------	1½ miles.
Large white house in woods	324	03	--	------	¾ mile.
Cream-colored house in woods	345	47	--	------	½ mile.

CREEK.

Locality.—North shore of Wicomico River about ¾ mile northwest of Mount Vernon wharf and about 1⅜ miles northeast of Mount Vernon Church. (See Chart No. 12.)

Observed station is on a marsh grass and sand point making out to the south and about 10 yards from the high-water mark of each of the three sides of the point. About 10 yards west of observed station is the mouth of a creek or drain 10 feet wide which runs only a short distance inland. There are several unpainted houses within 200 yards of observed station and a lone pear tree stands about 200 yards to the north. There is a cultivated field about 150 yards back of station which extends to edge of woods ¼ mile distant.

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

References.—	°	′	″		
"Mount Vernon Church" (S 30° 39′ W)	0	00	00	------	1⅜ miles.
Chimney on light-blue house with red blinds	13	46	--	------	1¼ miles.
Lone tree	72	59	--	------	1 mile.
Chimney of old unpainted house	108	18	--	------	300 yards.
Chimney of light-green trimmed house	135	15	--	------	200 yards.
Pear tree	159	48	--	------	200 yards.
Left chimney of cream-colored house	218	06	--	------	300 yards.
Tangent of cove	224	--	--	------	30 yards.
Smoke pipe on Mount Vernon wharf	282	34	--	------	¾ mile.
Chimney outside yellow house	312	04	--	------	⅝ mile.
Chimney on slate-colored house	352	57	--	------	¾ mile.

END.

Locality.—North shore of Wicomico River opposite Mount Vernon wharf. (See Chart No. 12.)

Observed station is on marsh land about 3 feet above and about 100 yards north of high-water mark in river and about 75 yards to the northwest of a large creek which runs about 2 miles inland. Water bushes skirt shore around station.

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

References.—	°	′	″		
"Jones" (S 60° 33′ W)	0	00	00	------	¾ mile.
Chimney on white house	7	24	--	------	1 mile.
Tangent of land	12	28	--	------	1 mile.
Near chimney of cream-colored house	68	25	--	------	½ mile.
Cupola on red barn	155	21	--	------	¾ mile.
Old-style windmill	163	26	--	------	¾ mile.
Chimney of Whitehaven Hotel	171	09	--	------	1¼ miles.
Webster's canning house	252	28	--	------	½ mile.
Right-hand chimney on gray house	273	42	--	------	½ mile.
Left side of Mount Vernon wharf	294	13	--	------	¼ mile.
Stack of Dashiell's canning house	304	52	--	------	⅜ mile.
Middle attic window of white house	328	54	--	------	½ mile.
Chimney outside of yellow house	352	12	--	------	½ mile.

WALNUT.

Locality.—South shore of Wicomico River about 175 yards east of Mount Vernon wharf. (See Chart No. 12.)

Observed station is on marsh land about 17 feet from shore and 50 yards west of a small creek. Several large walnut and locust trees stand about 250 yards south of station and 2 houses and 2 sheds about 250 yards to the southwest.

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

References.—	°	′	″		
"Jones" (S 83° 49′ W)	0	00	00	------	¾ mile.
Right side of Mount Vernon wharf house	17	18	--	------	175 yards.
Chimney outside of white house	46	52	--	------	1 mile.
Left chimney of gabled house	53	47	--	------	1 mile.
Old-style windmill	121	00	--	------	½ mile.
Left end of roof of Whitehaven wharf	136	18	--	------	1½ miles.
Chimney on Whitehaven Hotel	136	40	--	------	1½ miles.
Opening between pair of pine trees near Whitehaven	140	--	--	------	1½ miles.
Stack of Webster's canning house	187	38	--	------	300 yards.
Opening between two walnut trees	274	--	--	------	200 yards.
Chimney of Whitlock's house	307	37	--	------	250 yards.
Stack of Dashiell's canning house	352	23	--	------	400 yards.

JONES.

Locality.—South shore of Wicomico River about ¾ mile west of Mount Vernon wharf. (See Chart No. 12.)

Observed station is on a knoll about 25 feet above and 30 yards to south of high-water mark, and about 200 yards to the east of a cove. The knoll on which the station is located is the highest point on the shore in this locality. Several small cabins stand to the northward about 25 yards, and a large lone cedar tree about 35 yards to the southwest.

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

References.—	°	′	″		
"Ivee" (S 78° 54′ W)	0	00	00	------	¾ mile.
Large square chimney on four-gable house	10	05	--	------	¼ mile.
Cedar tree	11	22	--	------	25 yards.
Tangent of point of land	34	54	--	------	⅛ mile.
Nail in blaze in cedar tree	62	26	--	------	20.30 meters.
Chimney on light-green house on opposite shore	102	33	--	------	¾ mile.
White cupola in Whitehaven	148	53	--	------	2¼ miles.
Old-style windmill	153	31	--	------	1½ miles.
Whitehaven Hotel chimney	155	48	--	------	2¼ miles.
Large chimney on yellow house	178	37	--	------	¼ mile.
Chimney on end of brown house	216	37	--	------	½ mile.
Chimney on white house	266	42	--	------	¼ mile.
Weeping willow	307	55	--	------	¼ mile.
Nail in blaze in cedar tree	318	30	--	------	31.10 meters.

IVEE.

Locality.—Southeast shore of Wicomico River about ¼ mile northwest of Mount Vernon Church. (See Chart No. 12.)

Observed station is on grass land about 1 foot above and 10 feet back from high-water mark. A small cove makes in about 100 yards east of station. A small lone pine stands about 110 yards to

the east-southeast, and a sand bluff with pine trees about 100 yards to the southwest. Beyond the woods along the beach is a bluff 15 feet high upon which are several houses.

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

References.—

	°	′	″		
"Mount Vernon Church" (S 22° 37′ E)	0	00	00	------	⅜ mile.
White house chimney	55	35	--	------	¼ mile.
Chimney on end of white house	209	55	--	------	2 miles.
Chimney of green-trimmed house near "Creek"	245	28	--	------	1¼ miles.
Old-style windmill	264	47	--	------	2⅛ miles.
Slate-colored house	276	22	--	------	½ mile.
Chimney on middle of white house beyond woods	297	11	--	------	1 mile.
Lone pine tree	317	53	--	------	110 yards.

MOUNT VERNON CHURCH.

Locality.—Southeast side of Wicomico River about ⅜ mile back from the shore 1½ miles southwest of Mount Vernon wharf. (See Chart No. 12.)

Observed station is on main road in Mount Vernon and is situated on the highest point in the vicinity.

Marks.—Observed station is center of steeple of Mount Vernon Methodist Church.

References.—None necessary.

BALL.

Locality.—Southeast shore of Wicomico River on a point of land about 1 mile northeast of Wingate Point. (See Chart No. 12.)

Observed station is on a sand and grass point making out about 100 yards west of a sand bluff. A small creek empties into the river about 10 yards to the east, and three poplars stand about 100 yards to the south. The extreme northern end of the point is about 35 yards from station and the western side is about 10 yards.

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

References.—

	°	′	″		
"Holland" N 20° 03′ W)	0	00	00	------	½ mile.
Middle one of five pines	107	09	--	------	100 yards.
Chimney on John Withlock's house	137	57	--	------	100 yards.
Left end of pine woods	145	33	--	------	½ mile.
Right end of pine woods	165	04	--	------	½ mile.
Chimney on white house	183	32	--	------	¼ mile.
Third poplar	209	04	--	------	100 yards.
Chimney of brown house	248	27	--	------	½ mile.

WIND.

Locality.—Southeast shore of Wicomico River about ¼ mile north of southern end of Wingate Point. (See Chart No. 12.)

Observed station is about 30 yards from high-water mark of Wicomico River on the north side and 20 yards from the west side. An oyster watchhouse stands about 100 yards to the east of the station.

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

References.—

	°	′	″		
"Great Shoals Light" S 36° 29′ W)	0	00	00	------	1½ miles.
Tangent of Mollies Point	33	35	--	------	1 mile.
Left end of woods	46	12	--	------	1¾ miles.
Right end of woods	51	45	--	------	1¾ miles.
Tangent of Ellis Point	102	47	--	------	1 mile.
White house in woods	157	19	--	------	3 miles.
Smoke pipe on watchhouse	185	49	--	------	100 yards.
Chimney of brown house	203	38	--	------	½ mile.

References—Continued.

	°	′	″		
Chimney of cream-colored house with brown trimmings	215	34	00	------	½ mile.
Watchhouse	308	41	--	------	¼ mile.
Chimney on 2½-story house	342	18	--	------	3 miles.
Chimney on end of white house Dames Quarter	350	57	--	------	2½ miles.

LITTLE.

Locality.—Southern shore of Monie Bay on second prominent point of marsh about ¼ mile to the west entrance to Little Monie Creek. (See Chart No. 12.)

Observed station is on a marsh point covered with water bushes and reeds. It is about 1 foot above high-water mark, 7 yards from the west side, 10 yards from the east side, and about 50 yards from extreme end of point. No permanent reference objects near station.

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

References.—

	°	′	″		
"Great Shoals Light" (S 83° 43′ W)	0	00	00	------	2¼ miles.
Left side of woods on Nanticoke Point	19	34	--	------	3¼ miles.
Right side of woods on Nanticoke Point	22	24	--	------	3½ miles.
Tangent of Wingate Point	34	39	--	------	1½ miles.
Chimney on red roof white house	60	13	--	------	1¼ miles.
Chimney on near end of white house with brown trimmings	62	02	--	------	1½ miles.
Chimney on red roof white house with green blinds	62	43	--	------	1½ miles.
Left chimney of yellow house trimmed white	79	52	--	------	1½ miles.
Middle of woods	80	--	--	------	1¾ miles.
Large brown house	93	55	--	------	1¾ miles.
Mount Vernon Church	102	42	--	------	1¾ miles.
Tangent of point of land	165	47	--	------	¼ mile.
Tangent of point of land	320	16	--	------	75 yards.
Tangent of land	346	47	--	------	3 miles.

DOVE.

Locality.—South shore of Monie Bay and about ¼ mile east of entrance to Pigeon Creek. (See Chart No. 12.)

Observed station is on marsh land about 10 yards back from high-water mark not far from water bushes which stand to the east. Cement monument marking reference station is 13.98 meters southeast from observed station. No permanent reference objects near station.

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

References.—

	°	′	″		
"Great Shoals Light" (N 57° 41′ W)	0	00	00	------	1¼ miles.
Left side of Nanticoke Point woods	6	56	--	------	2¾ miles.
Left side of Roaring Point heavy woods	19	29	--	------	5 miles.
High lone pine showing above woods	23	36	--	------	5 miles.
Tangent of Wingate Point	52	52	--	------	2 miles.
Chimney of red roof house	67	39	--	------	2 miles.
Chimney on yellow house with red gable roof	84	12	--	------	3 miles.
Mount Vernon Church	86	37	--	------	3¼ miles.
Tangent of land	106	38	--	------	300 yards.
REFERENCE STATION	202	35	50	------	13.98 meters.
Chimney of white house with dark red trimmings	245	21	--	------	1¼ miles.

GREAT SHOALS LIGHT.

Locality.—Middle of entrances to Monie Bay and Wicomico River about halfway between Long Point to the south and Mollies Point to the north. (See Chart No. 12.)

Marks.—Observed station is center of black lantern on square screw pile structure known as "Great Shoals Light."

References.—

"Sharkfin Shoal Light" (S 81° 50′ W)	5⅞ miles.

SHORT.

Locality.—Southern shore of entrances to Monie Bay and Wicomico River on Long Point and about ¼ mile south-southwest from Great Shoals Light. (See Chart No. 12.)

Observed station is on a sandy knoll on eastern side of entrance to Dames Quarter Creek about 15 feet back from high-water mark on the north side and about 30 feet from east side of point It is on the highest part of the knoll which is about 5 feet above high-water mark.

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

References.—

	°	′	″	
"Sharkfin Shoal Light" (S 89° 03′ W)	0	00	00	5⅜ miles.
Tile pipe in cement ("Long" 1901)	23	57	45	63.703 meters.
Nanticoke wharf	67	57	--	4⅛ miles.
Left side of Nanticoke woods	69	13	--	2 miles.
Yellow house with red blinds	74	53	--	3½ miles.
Left tangent of Wingate Point	124	13	--	2⅜ miles.
Chimney on red roof white house	132	39	--	3 miles.
Near chimney of yellow house	136	40	--	3 miles.
Chimney on red trimmed house	212	49	--	2 miles.
Left tree at Dames Quarter	260	37	--	¼ mile.
Chimney on white barn	279	45	--	300 yards.
Left chimney on white house	320	05	--	200 yards.
Chimney on yellow house	341	35	--	200 yards.

ROOM.

Locality.—Upper end and eastern shore of Tangier Sound on Halls Point. (See Chart No. 12.)

Observed station is on a bluff 15 feet high about 5 yards back from its edge. It is about 25 yards east of a clump of mulberry trees and about 15 yards north-northwest of a barn. Locust and mulberry trees stand all about station and locust bushes along the edge of the bluff. A wagon trail runs parallel to the shore about 15 yards back of station. Cement monument marking reference station is 21.45 meters south-southwest of observed station and almost in line with a large mulberry tree.

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

References.—

	°	′	″	
"Sharkfin Shoal Light" (N 70° 00′ W)	0	00	00	2½ miles.
Gable on near side of red roof on white house on Bishops Head	3	01	--	5¼ miles.
Near end of roof of large 2½-story house	12	53	--	7¾ miles.
Left tangent of Clay Island	39	18	--	3½ miles.
Left side of Sandy Point woods	70	08	--	4 miles.
Roaring Point wharf	85	22	--	5 miles.
Near chimney on end of large red roof white house	94	36	--	4¼ miles.
Right side of Nanticoke woods	110	28	--	3¾ miles.
Mount Vernon Church	127	18	--	7 miles.
Near corner of barn	137	06	--	15.96 meters.

References—Continued.	°	′	″		
Right-hand corner of barn	152	08	--	------	18.11 meters.
REFERENCE STATION	268	30	00	------	21.45 meters.
Large cedar tree	276	30	--	------	100 yards.
Two-inch iron pipe	279	38	30	------	9.21 meters.

HAINES.

Locality.—Upper end and eastern shore of Tangier Sound on Haines Point, about ⅝ mile north of Deal Island wharf. (See Chart No. 12.)

Observed station is on sand and grass point about 20 yards back and 5 feet above high-water mark. Locust and water bushes stand about 20 yards to the north and the left edge of this clump is about on line with Sharkfin Shoal Light. A barbwire fence runs 3 yards east of station. Cement monument marking reference station is 9.64 meters east of observed station.

Marks.—Observed station is nail in pine stub in center of a drain tile with top broken off below surface. Reference station is center point of triangle on standard cement monument.

References.—	°	′	″		
"Sharkfin Shoal Light" (N 45° 58′ W)	0	00	00	------	2½ miles.
Left of bushes	39	57	--	------	20 yards.
Left of Sandy Point woods	53	38	--	------	4¾ miles.
Chimney of 2½-story white house trimmed with red	75	04	--	------	½ mile.
Chimney of unpainted house	85	49	--	------	350 yards.
Chimney on end of red cottage trimmed white	99	00	--	------	¾ mile.
REFERENCE STATION	123	40	40	------	9.64 meters.
Pine tree	148	37	30	------	2.14 meters.
Large square chimney on red house	152	49	--	------	400 yards.
Right one of 5 large pines	184	40	--	------	300 yards.
Half way between chimneys on store on Deal Island	213	08	--	------	¾ mile.
Deal Island Church	217	00	--	------	1½ miles.
Black gum tree	223	49	--	------	6.70 meters.
Right end of Deal Island wharf	234	10	--	------	½ mile.
Hooper Straits Light	343	34	--	------	7½ miles.

DEAL ISLAND CHURCH.

Locality.—Deal Island on main road about ¼ mile from the shore and about ¾ mile south of Laws Thoroughfare. (See Chart No. 12.)

Marks.—Observed station is center of steeple on Deal Island Methodist Church.

References.—None necessary.

BAR.

Locality.—Eastern shore of Tangier Sound on western side of Deal Island, about 1 mile northwest of entrance to Lower Thoroughfare and ½ mile south of Middle Creek. (See Chart No. 12.)

Observed station is about 10 yards east of high-water mark on sand and grass land back of sandy beach. The first of many tree stumps which are submerged at high water commence about 100 yards to the north and cat-tails grow abundantly back of station. Cement monument marking reference station is 6.09 meters east of observed station.

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

References.—	°	′	″		
"Sharkfin Shoal Light" (N 19° 40′ W)	0	00	00	------	4½ miles.
Tangent of Haines Point	27	29	--	------	2½ miles.

References—Continued.	°	′	″		
Flag pole on large building on Deal Island wharf	28	45	--	------	2 miles.
Middle chimney of large gray building	37	41	--	------	1 mile.
Chimney on white house	59	54	--	------	400 yards.
Middle chimney on red roof white house	79	51	--	------	3/8 mile.
REFERENCE STATION	107	10	00	------	6.09 meters.
Chimney on white house	118	43	--	------	400 yards.
Chimney on dark gray house	161	57	--	------	300 yards.
Right chimney on white four-gabled house with red roof	176	39	--	------	1/2 mile.

BOUNDARIES OF OYSTER BARS.

EXPLANATION OF DESCRIPTION OF BOUNDARIES.

The oyster bars of Wicomico County are 15 in number, and their total area, as marked out by buoys placed by the hydrographic engineer of the Commission, is 1,638 acres. As provided by law, the boundaries of the oyster bars are all straight lines, but they inclose areas of all shapes from triangles to complicated eight-sided figures, and of all sizes from 1,123 acres to 4 acres.[a] The sides vary in length from 120 to 3,800 yards, and in some cases the corners of the boundaries are practically at the triangulation stations from which they are located, while in other instances they are over 7,500 yards from the landmarks most available for the purpose of fixing their positions.

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 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.

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 the county.

At the top of each tabular form is given the legal name of the oyster bar to be described, its general locality, and the serial number of the "Charts of Oyster Bars" of Maryland on which its legal boundaries are shown.

The first 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.

The second and third columns, under the headings of "Latitude" and "Longitude," give the geographic positions of the corners. These positions have been adopted by the

[a] For similar statistics for other counties that have been surveyed, see Appendix C of this publication.

Commission as the primary technical definition 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 of the Survey, even though all the landmarks and buoys originally used for their location have been destroyed by natural causes or by acts of vandals desiring to defeat the purposes of the oyster laws of Maryland.

The fourth and fifth 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.

The sixth 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.

The seventh and last column, under the heading of "U. S. C. & G. S. triangulation station," [b]gives the names of the landmarks from which were computed the correspond ing "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.

[a] The mean magnetic variation for Wicomico County is 5° 45′ west of north (1908), and is increasing at the rate of 3′ yearly.

[b] Geographic positions of these triangulation stations can be obtained by application to the Superintendent of the Coast and Geodetic Survey at Washington.

(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 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 "Upper Stake" 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 "Juliet" and "Earle" as determined from right to left from the forward bearings from this corner is 92° 57′ and the angle between "Earle" and "Streett" is 66° 51′. 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.

[a] The mean magnetic variation for Wicomico County is 5° 45′ west of north (1908) and is increasing at the rate of 3′ yearly.

(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.

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° 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.

UPPER STAKE.

(*Nanticoke River—Chart No. 11.*)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 20 06.36	75 52 59.76	S 0 01 E	N 0 01 W	811	Juliet.
			N 59 07 E	S 59 08 W	1718	Earle.
			N 3 51 E	S 3 51 W	2209	Streett.
2	38 20 08.36	75 53 06.16	S 11 10 E	N 11 10 W	895	Juliet.
			N 63 45 E	S 63 46 W	1834	Earle.
			N 8 28 E	S 8 28 W	2160	Streett.
3	38 20 22.41	75 53 07.20	S 8 27 E	N 8 27 W	1366	Juliet.
			N 78 36 E	S 78 36 W	1706	Earle.
			N 11 45 E	S 11 45 W	1703	Streett.
4	38 20 19.59	75 52 32.41	N 59 59 E	S 59 59 W	864	Earle.
			N 78 39 W	S 78 40 E	3169	Gover.
			S 29 56 W	N 29 56 E	1449	Juliet.

WETIPQUIN.

(*Nanticoke River—Chart No. 11.*)

	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 19 47.59	75 53 16.03	S 67 52 E	N 67 53 W	470	Juliet.
			N 51 35 E	S 51 36 W	2433	Earle.
			N 48 52 W	S 48 52 E	2587	Gover.
2	38 20 01.90	75 53 21.70	S 41 37 W	N 41 37 E	883	Juliet.
			N 63 25 E	S 63 26 W	2300	Earle.
			N 55 51 W	S 55 52 E	2173	Gover
3	38 20 08.36	75 53 06.16	S 11 10 E	N 11 10 W	895	Juliet.
			N 63 45 E	S 63 46 W	1834	Earle.
			N 8 28 E	S 8 28 W	2160	Streett.

BOUNDARIES OF NATURAL OYSTER BARS—continued.

SAND LUMP.

(*Nanticoke River—Chart No. 11.*)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 18 45.20	75 53 49.80	N 34 40 E	S 34 40 W	2342	Juliet.
			N 63 18 W	S 63 19 E	2780	Ar.
			S 10 25 W	N 10 25 E	536	Pole.
2	38 18 52.18	75 53 47.54	N 36 57 E	S 36 58 W	2116	Juliet.
			N 68 16 W	S 68 17 E	2739	Ar.
			S 11 36 E	N 11 36 W	779	Pole.
3	38 18 48.82	75 53 42.02	N 31 57 E	S 31 58 W	2127	Juliet.
			N 67 16 W	S 67 17 E	2918	Ar.
			S 25 04 W	N 25 04 E	717	Pole.

HICKORY NUT.

(*Nanticoke River—Chart No. 11.*)

	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 18 35.22	75 53 50.58	N 30 52 E	S 30 53 W	2637	Juliet.
			N 57 14 W	S 57 14 E	2930	Ar.
			S 21 47 W	N 21 47 E	206	Pole.
2	38 18 38.40	75 54 08.15	S 52 39 E	N 52 39 W	491	Pole.
			S 40 10 E	N 40 10 W	2821	Juliet.
			N 53 29 W	S 53 29 E	2485	Ar.
3	38 18 45.20	75 53 49.80	N 34 40 E	S 34 40 W	2342	Juliet.
			N 63 18 W	S 63 19 E	2780	Ar.
			S 10 25 W	N 10 25 E	536	Pole.

OLD WOMANS PATCH.

(*Nanticoke River—Chart No. 11.*)

	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 18 21.60	75 54 11.80	N 42 53 W	S 42 54 E	2792	Ar.
			S 83 47 W	N 83 46 E	3241	Okay.
			S 15 20 W	N 15 20 E	1655	Rag.
2	38 18 29.24	75 54 16.24	N 44 54 W	S 44 55 E	2524	Ar.
			S 78 55 W	N 78 54 E	3164	Okay.
			S 9 47 W	N 9 47 E	1880	Rag.
3	38 18 31.58	75 54 06.00	N 50 14 W	S 50 15 E	2672	Ar.
			S 78 30 W	N 78 28 E	3446	Okay.
			S 17 02 W	N 17 01 E	2020	Rag.

BOUNDARIES OF NATURAL OYSTER BARS—continued.

CEDAR SHOAL.

(*Nanticoke River—Chart No. 11.*)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 18 09.96	75 54 12.74	N 37 34 W	S 37 35 E	3075	Ar.
			N 89 15 W	S 89 16 E	3197	Okay.
			S 18 56 W	N 18 56 E	1272	Rag.
2	38 18 12.02	75 54 28.56	N 31 34 W	S 31 36 E	2779	Ar.
			S 89 25 W	N 89 24 E	2778	Okay.
			S 0 22 E	N 0 22 W	1272	Rag.
3	38 18 24.37	75 54 31.60	N 35 09 W	S 35 09 E	2387	Ar.
			S 80 38 W	N 80 37 E	2733	Okay.
			S 3 01 E	N 3 00 W	1691	Rag.
4	38 18 27.58	75 54 20.33	N 42 14 W	S 42 14 E	2490	Ar.
			S 79 33 W	N 79 32 E	3047	Okay.
			S 6 41 W	N 6 41 E	1809	Rag.

LONG SHOAL.

(*Nanticoke River—Chart No. 11.*)

	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 18 17.84	75 54 55.96	N 18 30 W	S 18 30 E	2290	Ar.
			S 83 45 W	N 83 44 E	2061	Okay.
			S 26 38 E	N 26 37 W	1643	Rag.
2	38 18 27.04	75 54 54.42	N 22 25 W	S 22 25 E	2013	Ar.
			S 75 37 W	N 75 37 E	2152	Okay.
			S 21 21 E	N 21 21 W	1908	Rag.
3	38 18 26.22	75 54 37.60	N 32 44 W	S 32 45 E	2246	Ar.
			S 78 42 W	N 78 41 E	2587	Okay.
			S 8 04 E	N 8 04 W	1768	Rag.

CHERRY TREE.

(*Nanticoke River—Chart No. 11.*)

	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 18 06.21	75 54 38.20	N 25 03 W	S 25 04 E	2830	Ar.
			N 86 11 W	S 86 12 E	2526	Okay.
			S 13 47 E	N 13 47 W	1108	Rag.
2	38 18 13.16	75 54 44.72	N 23 46 W	S 23 46 E	2545	Ar.
			S 88 23 W	N 88 22 E	2349	Okay.
			S 18 27 E	N 18 27 W	1381	Rag.
3	38 18 15.00	75 54 33.76	N 30 09 W	S 30 09 E	2621	Ar.
			S 87 13 W	N 87 12 E	2642	Okay.
			S 6 03 E	N 6 03 W	1387	Rag.

BOUNDARIES OF NATURAL OYSTER BARS—continued.

WILSON SHOALS.

(*Lower Nanticoke River—Chart No. 11.*)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C^{e} & G. S. triangulation station
			Forward	Back		
	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 17 04.58	75 55 15.02	S 36 46 E	N 36 44 W	2221	Nanticoke Church.
			N 51 08 E	S 51 08 W	1597	Rag.
			N 34 29 W	S 34 30 E	2724	Okay.
2	38 17 06.76	75 55 27.60	S 41 55 E	N 41 55 W	2490	Nanticoke Church.
			N 59 31 E	S 59 32 W	1830	Rag.
			N 29 05 W	S 29 05 E	2486	Okay.
3	38 17 55.16	75 55 18.02	N 69 44 W	S 69 44 E	1559	Okay.
			S 2 42 E	N 2 42 W	4131	Roar.
			S 61 59 E	N 61 58 W	1498	Rag.
4	38 18 03.50	75 54 52.84	N 16 57 W	S 16 58 E	2776	Ar.
			N 83 04 W	S 83 05 E	2148	Okay.
			S 33 33 E	N 33 33 W	1182	Rag.
5	38 17 44.10	75 54 50.18	S 60 25 E	N 60 24 W	670	Rag.
			N 44 31 E	S 44 32 W	2150	Pole.
			N 67 28 W	S 67 29 E	2384	Okay.

ROARING POINT EAST.

(*Lower Nanticoke River—Chart No. 12.*)

	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 15 37.80	75 55 33.62	S 34 23 E	N 34 22 W	4041	Nanti.
			N 50 18 E	S 50 19 W	791	Roar.
			N 65 17 W	S 65 18 E	1942	Cow.
2	38 15 46.36	75 55 49.20	N 78 01 E	S 78 02 W	1047	Roar.
			N 30 35 E	S 30 34 W	4228	Rag.
			N 68 50 W	S 68 50 E	1448	Cow.
3	38 16 07.78	75 55 43.22	S 82 29 W	N 82 28 E	1522	Cow.
			S 59 42 E	N 59 42 W	1002	Roar.
			N 86 14 E	S 86 15 W	2083	Nanticoke Church.

BOUNDARIES OF NATURAL OYSTER BARS—continued.

MIDDLEGROUND.

(*Mouth Nanticoke River—Chart No. 12.*)

Corner of bar	Latitude	Longitude	True bearing Forward	True bearing Back	Distance	U. S. C. & G. S. triangulation station
	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 12 26.22	75 55 40.38	N 79 30 E	S 79 32 W	4697	Great Shoals Light.
			N 29 24 W	S 29 25 E	4058	Frog.
			S 83 42 W	N 83 39 E	5699	Sharkfin Shoal Light.
2	38 12 32.01	75 55 51.86	N 82 21 E	S 82 23 W	4968	Great Shoals Light.
			N 26 49 W	S 26 48 E	3741	Frog.
			S 81 17 W	N 81 15 E	5422	Sharkfin Shoal Light.
3	38 12 47.41	75 55 44.62	N 88 17 E	S 88 19 W	4734	Great Shoals Light.
			N 33 40 W	S 33 41 E	3389	Frog.
			S 76 26 W	N 76 23 E	5711	Sharkfin Shoal Light.
4	38 13 13.01	75 55 54.46	S 81 47 E	N 81 45 W	5045	Great Shoals Light.
			N 39 34 W	S 39 35 E	2539	Frog.
			S 67 23 W	N 67 21 E	5729	Sharkfin Shoal Light.
5	38 14 43.39	75 55 32.02	N 13 38 E	S 13 38 W	2408	Roar
			N 34 19 W	S 34 20 E	3204	Cow.
			S 63 48 W	N 63 47 E	2468	Frog.
6	38 15 03.62	75 55 00.00	N 9 44 W	S 9 44 E	1683	Roar.
			N 53 32 W	S 53 33 E	3305	Cow.
			S 59 59 W	N 59 58 E	3541	Frog.
7	38 13 12.39	75 55 00.00	S 78 48 E	N 78 47 W	3613	Great Shoals Light.
			N 57 10 W	S 57 11 E	3649	Frog.
			S 72 04 W	N 72 02 E	7082	Sharkfin Shoal Light.
8	38 13 10.60	75 54 40.80	S 78 04 E	N 78 03 W	3100	Great Shoals Light.
			N 60 19 W	S 60 21 E	4116	Frog.
			S 73 42 W	N 73 39 E	7553	Sharkfin Shoal Light.

BIG HILL.

(*Mouth Nanticoke River—Chart No. 12.*)

	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 12 23.70	75 56 45.82	N 81 34 E	S 81 37 W	6429	Great Shoals Light.
			N 3 58 W	S 3 58 E	3629	Frog.
			S 82 08 W	N 82 07 E	3960	Sharkfin Shoal Light.
2	38 12 29.41	75 56 47.82	N 83 20 E	S 83 22 W	6457	Great Shoals Light.
			N 3 19 W	S 3 19 E	3433	Frog.
			S 79 15 W	N 79 14 E	3938	Sharkfin Shoal Light.
3	38 12 32.10	75 56 32.89	N 83 45 E	S 83 48 W	6052	Great Shoals Light.
			N 10 07 W	S 10 07 E	3397	Frog.
			S 79 04 W	N 79 01 E	4346	Sharkfin Shoal Light.
4	38 12 25.42	75 56 36.84	N 81 47 E	S 81 49 W	6184	Great Shoals Light.
			N 7 50 W	S 7 50 E	3596	Frog.
			S 81 48 W	N 81 46 E	4205	Sharkfin Shoal Light.

BOUNDARIES OF NATURAL OYSTER BARS—continued.

GREAT SHOALS.

(Mouth Wicomico River—Chart No. 12.)

Corner of bar	Latitude	Longitude	True bearing Forward	True bearing Back	Distance	U. S. C. & G. S. triangulation station
	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 12 47.01	75 52 37.71	N 54 28 W	S 54 28 E	285	Great Shoals Light.
			S 39 20 W	N 39 19 E	1505	Short.
			S 57 44 E	N 57 43 W	1979	Dove.
2	38 13 00.41	75 54 00.00	S 37 25 E	N 37 25 W	2034	Short.
			S 81 19 E	N 81 18 W	1971	Great Shoals Light.
			N 11 40 E	S 11 40 W	1433	White.
3	38 13 13.97	75 54 00.00	S 30 49 E	N 30 48 W	2414	Short.
			S 68 49 E	N 68 48 W	2090	Great Shoals Light.
			N 17 01 E	S 17 01 W	990	White.
4	38 13 20.76	75 52 19.72	N 36 44 E	S 36 44 W	1545	Wind.
			S 28 34 E	N 28 35 W	2500	Dove.
			S 36 10 W	N 36 10 E	1219	Great Shoals Light.
5	38 12 49.82	75 52 24.28	S 48 49 E	N 48 49 W	1749	Dove.
			S 46 10 W	N 46 10 E	1818	Short.
			N 84 22 W	S 84 22 E	601	Great Shoals Light.

INGRAM SHOAL.

(Lower Wicomico River—Chart No. 12.)

	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 13 38.61	75 52 23.64	S 21 12 W	N 21 12 E	1702	Great Shoals Light.
			N 58 14 E	S 58 14 W	1210	Wind.
			N 0 31 W	S 0 31 E	1877	Ella.
2	38 13 51.98	75 52 31.90	S 10 59 W	N 10 59 E	2075	Great Shoals Light.
			N 81 31 E	S 81 32 W	1262	Wind.
			N 8 06 E	S 8 06 W	1439	Ella.
3	38 13 57.26	75 52 18.97	S 18 28 W	N 18 28 E	2335	Great Shoals Light.
			N 89 29 E	S 89 30 W	904	Wind.
			N 6 28 W	S 6 28 E	1255	Ella

BOUNDARIES OF NATURAL OYSTER BARS—continued.

HOLLAND.

(*Lower Wicomico River—Chart No. 12.*)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station
			Forward	Back		
	° ′ ″	° ′ ″	° ′	° ′	*Yards.*	
1	38 14 36.02	75 51 06.20	N 8 40 W	S 8 40 E	469	Holland.
			S 38 27 W	N 38 26 E	1659	Wind.
			S 32 56 E	N 32 56 W	414	Ball.
2	38 14 38.98	75 51 09.36	N 1 40 E	S 1 40 W	364	Holland.
			S 34 06 W	N 34 06 E	1690	Wind.
			S 34 36 E	N 34 35 W	545	Ball.
3	38 14 42.04	75 51 03.04	N 30 42 W	S 30 42 E	303	Holland.
			S 36 36 W	N 36 36 E	1871	Wind.
			S 14 23 E	N 14 23 W	569	Ball.
4	38 14 39.00	75 51 00.40	N 31 47 W	S 31 47 E	428	Holland.
			S 40 16 W	N 40 16 E	1834	Wind.
			S 9 00 E	N 9 00 W	454	Ball.

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.

[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 so 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 amount of damage done thereto by reason of the removal of fences, cutting of trees or injury 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.

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 First 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."

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."

DEFINITION OF A NATURAL OYSTER BAR.

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 bar which very nearly approaches a reasonable and satisfactory compromise between the extreme views given above and which has therefore been adopted by the Commission, 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. Tood, *v.* Job T. Moore. It 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 cannot be located or appropriated by any individual."

APPENDIX C.—STATISTICS OF RESULTS OF THE COMBINED OPERATIONS OF THE GOVERNMENT AND STATE.

For a further understanding of the character of the oyster survey work that is being carried on in Maryland, the following statistical tabulation of the combined results of the various operations of both the Government and State will be of value. In this connection it should be remembered that

these statistics only include the new work required to supplement the large amount of existing data obtained from the archives of the Coast and Geodetic Survey and utilized in the preparation of the charts and technical records.

Operations	County			Total.
	Anne Arundel	Somerset	Wicomico	
Natural oyster bars surveyed and delineated	91	37	15	143
Acres of natural oyster bars	33,666	27,566	1,638	[a] 62,870
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	569
Triangulation landmarks established	123	86	30	[b] 209
Miles of shore line covered by triangulation	110	125	46	[b] 265
Square miles of water covered by triangulation	220	375	44	[b] 620
Miles of examination of shell bottom with chain apparatus	369	296	58	723
Oyster investigation stations occupied	440	679	162	1,281
Number of soundings over shell bottoms	37,049	17,904	3,387	58,340
Square miles covered by soundings and chain apparatus	58	47	3	108
Projections prepared and plotted	9	13	2	[b] 23
Leasing charts prepared	13	12	2	27
Oyster charts published	4	6	2	12
Reports published	2	2	2	6
Progress maps published	2	2	1	5

[a] Total area of natural oyster bars of Connecticut is 5,770 acres.
[b] Less quantities covered by statistics of more than one county.

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COAST AND GEODETIC SURVEY

PROGRESS MAP

WICOMICO COUNTY
MARYLAND

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

1907

⊙ Landmarks (Coast Survey Triangulation Stations)
Waters contiguous to county
Waters within territorial limits of county
Limits of projections on file at Washington
Limits of charts published by Coast and Geodetic Survey