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Diag. Chy. No.
 Department of Commerce and Labor
 COAST AND GEODETIC SURVEY
 J. H. Ottmann
 Superintendent.

State: Maryland

DESCRIPTIVE REPORT.

9 Hydrographic Sheets No. 2880
 2881
 2882
 2883-6
 2884-4

LOCALITY:
Chesapeake Bay and
tributaries adjacent
to Anne Arundel Co.,

1906-7.

CHIEF OF PARTY:
C. C. Yates

(See following page)

2881

2885

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

D E S C R I P T I V E R E P O R T

TO ACCOMPANY HYDROGRAPHIC PROJECTIONS RESULTING
FROM THE SURVEY OF OYSTER BARS OF ANNE ARUNDEL
COUNTY, MARYLAND MADE BY THE MARYLAND SHELL FISH
COMMISSION IN COOPERATION WITH THE UNITED STATES
COAST AND GEODETIC SURVEY.

PROJECTIONS

- 2874 A---Chesapeake Bay, North Point to Belvidere Shoals
- 2878 B---Magothy River.
- 2879 C---Chesapeake Bay, Belvidere Shoals to Sandy Point
- 2880 D---Upper Severn River
- 2881 E---Lower Severn River
- 2882 F---South River
- 2883 G---West and Rhode Rivers
- H---Chesapeake Bay, Horseshoe Point to Holland Point
- 2886 I---Chesapeake Bay, Off Mouth of South and West Rivers

UNITED STATES COAST AND GEODETIC SURVEY
C. C. Yates, Chief of Party

MARYLAND SHELL FISH COMMISSION
Swepson Earle, Hydrographic Engineer.

1906----1907

*(Extracts from publications
bearing on hydrographic projections
covered by this Descriptive Report)*

DEPARTMENT OF COMMERCE AND LABOR

COAST AND GEODETIC SURVEY

O. H. TITTMANN, Superintendent

(See page 18)

SURVEY OF OYSTER BARS

ANNE ARUNDEL COUNTY

MARYLAND

DESCRIPTION OF BOUNDARIES AND LANDMARKS AND REPORT
OF WORK OF UNITED STATES COAST AND GEODETIC SURVEY
IN COOPERATION WITH MARYLAND SHELL FISH COMMISSION

By C. C. YATES

ASSISTANT AND CHIEF OF PARTY, COAST AND GEODETIC SURVEY



WASHINGTON
GOVERNMENT PRINTING OFFICE

1907

(See last page for Progress Maps)

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

SURVEY OF OYSTER BARS

ANNE ARUNDEL COUNTY
MARYLAND

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WASHINGTON
GOVERNMENT PRINTING OFFICE

1907

DEPARTMENT OF COMMERCE AND LABOR

Document No. 77.

COAST AND GEODETIC SURVEY

LETTER OF SUBMITTAL.

DEPARTMENT OF COMMERCE AND LABOR,
COAST AND GEODETIC SURVEY,
Washington, June 1, 1907.

SIR: I have the honor to transmit herewith the report of the officer detailed from the Coast and Geodetic Survey to cooperate with the Maryland Shell Fish Commission in surveying the oyster beds of the State of Maryland, 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 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," approved May 26, 1906, and certain results which are necessary for the interpretation and use of the plats of the survey.

Respectfully,

O. H. TITTMANN, *Superintendent.*

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

CERTIFICATION.

ANNAPOLIS, MD., *May 29, 1907.*

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

C. C. YATES,

Assistant and Chief of Party in the Coast and Geodetic Survey.

ANNAPOLIS, MD., *June 6, 1907.*

Examined and certified to be correct.

WALTER J. MITCHELL,

BENJAMIN K. GREEN,

CASWELL GRAVE,

Maryland Shell Fish Commissioners.

SWEPSON EARLE,

Hydrographic Engineer.

NOTE.—Copies of this publication and of the charts of the natural oyster bars of "Anne Arundel County and Adjacent Waters" were filed in the office of the clerk of the circuit court of Anne Arundel County and in the office of the Board of Shell Fish Commissioners at Annapolis on June 20, 1907.

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SURVEY OF OYSTER BARS, ANNE ARUNDEL COUNTY, MD.

INTRODUCTION.

PUBLICATIONS.

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

The part prepared under the direction of the Superintendent of the Coast and Geodetic Survey consists of this publication and a series of large-scale charts. The charts show all legal boundaries of natural oyster bars within the waters opened up for leasing with Anne Arundel County and the location of all landmarks (Coast and Geodetic Survey triangulation stations) used in connection with the delineation of these boundaries. This publication gives a technical description of the oyster-bar boundaries and landmarks shown on the charts, and includes the report of the representative of the Coast and Geodetic Survey.

The part to be published by the Shell Fish Commission will include a report of the work executed by the commission under the provisions of the oyster-culture laws of Maryland, descriptions of oyster investigations and the delimitation of oyster bars, and other important legal and scientific information.

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 for all surveying, charting, and other allied purposes within the area of the operations of the service, the cooperation of the Coast and Geodetic Survey with the Maryland Shell Fish Commission is a practical and useful development of Government work.

LAWS RELATING TO THE COOPERATION.

The work of the Coast and Geodetic Survey and of the Bureau of Fisheries, in cooperation with the Maryland Shell Fish Commission, in surveying and publishing charts of natural oyster bars, establishing permanent landmarks over triangulation stations, and preparing for publication the necessary technical and legal descriptions of boundaries and landmarks delineated on the 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 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 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.

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 Shell Fish Commissioners in making a survey of and locating the natural oyster beds, bars, and rocks in the waters within the State of Maryland; 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 Shell Fish 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 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 Shell Fish Commission of the State of Maryland, to be immediately available and to continue available until expended, twenty-five thousand dollars. * * *

CHARTS AND MAPS.

CHARTS OF NATURAL OYSTER BARS.

The charts^a of the natural oyster bars of "Anne Arundel 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 a series of four sheets, covering the west shore of Chesapeake Bay from Fort Carroll to Holland Point. They are published on the scale of 1 part in 20,000 (approximately $3\frac{1}{8}$ 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 bar and other boundaries established by the Commission, and are certified by them for the purpose of filing in the office of the clerk of the circuit court of Anne Arundel County and in the office of the Commission at Annapolis, as required by the oyster-culture laws of Maryland.

In addition to the 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 necessary to make the technical definitions and delineations of boundaries readily understandable, both by the people engaged in 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, and are not designated by numbers, as might suggest itself on first thought as being the best method when the great number of oyster bars in the whole State are considered. By the use of local names, it is believed that much confusion will be avoided in the location of oyster bars, especially by those not familiar with charts.

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

The natural oyster bars and landmarks have been grouped in the contents of this publication in accordance with the charts upon which they are shown. To find a 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 for the depth of water at mean low tide have been taken from the hydrographic sheets of the Coast and Geodetic Survey at Washington. Four curves

^aFor copies of these charts apply to the Superintendent of the Coast and Geodetic Survey at Washington, D. C.

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 the oyster industry. The 1-fathom contour (6 feet) and the 5-fathom contour (30 feet) practically include all the natural oyster bars surveyed, while the 3-fathom contour (18 feet) furnishes the curve of about the average depth. 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 and the boundaries of waters not within these limits but opened up for the leasing with the county are plainly indicated on the charts. A full technical description of these boundaries is given in this publication under the heading "Boundaries of county waters."

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

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 notes on the charts.

PROJECTIONS.

The polyconic projections, like the charts which are described in the preceding section, were all constructed by draftsmen of the Coast and Geodetic Survey. These draftsmen also plotted the sextant positions on the smooth projections which determine the location of the legal boundaries of the natural 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 natural oyster bar and other boundaries established by the commission. One set of these projections is filed in the archives of the Coast and Geodetic Survey at Washington and the other set is filed in the office of the Shell Fish Commission at Annapolis.

PROGRESS MAP.

The progress map^a attached to this publication is on a scale of one part in a hundred thousand, and shows in outline the work accomplished by the U. S. Coast and Geodetic Survey in Anne Arundel County and contiguous waters. It gives the scheme of all the charts and smooth projections constructed in connection with the survey of the natural oyster bars, the location and names of all triangulation stations used as a basis for the surveying work, and the "Boundaries of county waters" established

^a For this map, see folder at end of this publication.

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, the 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.

BOUNDARIES OF COUNTY WATERS.

WATERS WITHIN TERRITORIAL LIMITS OF THE COUNTY.

The laws relating to oyster culture under which the Maryland Shell Fish Commission is executing its survey, 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^a between the waters "within the territorial limits" of Anne Arundel County and the waters in "any other place," as established by the Shell Fish Commission and delineated on the charts and the smooth projections of the Coast and Geodetic Survey, is technically described and defined as follows:

Commencing at a point defined by the intersection of the northern boundary line of Anne Arundel County with the center line of Fort McHenry Channel; thence along the center line of Fort McHenry Channel past Fort Carroll to a point at the intersection of the center line of Fort McHenry Channel and the center line of Brewerton Channel; thence along the center line of Brewerton Channel to a point defined by the intersection of the center line of Brewerton Channel and a straight line between North Point (Old Tower) and a point defined by latitude ^b 39° 09' 59.3'' and longitude ^b 76° 28' 39.7'', situated on Rock Point; thence in a straight line to a point defined by latitude 39° 09' 59.3'' and longitude 76° 28' 39.7'' situated on Rock Point; thence following the mean low-water line along the shore of the bay to a point defined by latitude 39° 08' 10.6'' and longitude 76° 26' 21.2'', situated on Frankie Point; thence in a straight line across the mouth of Bodkin Creek to a point situated at the center of the old light-house tower on Bodkin Point; thence following the mean low-water line along the shore of the bay to a point defined by latitude 39° 03' 35.2'' and longitude 76° 25' 56.4'', situated on Mountain Point; thence in a straight line across the mouth of Magothy River to a point defined by latitude 39° 03' 11.1'' and longitude 76° 26' 18.7'', situated on Persimmon Point; thence following the mean low-water line along the shore of the bay around Sandy Point to a point defined by latitude 38° 59' 10.1'' and longitude 76° 25' 33.4'', situated on Hackett Point; thence in a straight line across the mouth of Whitehall Bay to a point defined by latitude 38° 58' 25.0'' and longitude 76° 27' 19.0'', situated on Greenbury Point; thence in a straight line across the mouth of Severn River to a point defined by latitude 38° 56' 28.0'' and longitude 76° 27' 00.0'', situated on Tolly Point; thence following the mean low-water line along the shore of the bay to a point defined by latitude 38° 54' 42.0'' and longitude 76° 27' 25.2'', situated on a point of land on the north side of Fishing Creek; thence in a straight line across the mouth of Fishing Creek to a point defined by latitude 38° 54' 29.1'' and longitude 76° 27' 12.9'', situated on Thomas Point; thence in a straight line across the mouth of South River to a point defined by latitude 38° 53' 13.6'' and longitude 76° 29' 21.9'', situated on Saunders Point; thence following the mean low-water line along the shore of the bay to a point defined by latitude 38° 52' 10.4'' and longi-

^aSee Charts of Natural Oyster Bars, published by the U. S. Coast and Geodetic Survey, and the progress map at the end of this publication.

^bLatitudes and longitudes based on the United States standard datum of the U. S. Coast and Geodetic Survey.

tude $76^{\circ} 30' 35.6''$, situated on Dutchman Point; thence in a straight line across the mouth of West River to a point defined by latitude $38^{\circ} 51' 12.8''$ and longitude $76^{\circ} 29' 53.8''$, situated on Curtis Point; thence following the mean low-water line along the shore of the bay to a point defined by latitude $38^{\circ} 48' 02.8''$ and longitude $76^{\circ} 30' 36.6''$, situated on a point about three-quarters of a mile north of Broadwater Creek; thence in a straight line across the mouth of Broadwater Creek to a point defined by latitude $38^{\circ} 47' 21.3''$ and longitude $76^{\circ} 31' 26.3''$, situated on a point at the southern entrance to Broadwater Creek; thence following the mean low-water line along the shore of the bay to a point defined by latitude $38^{\circ} 46' 22.2''$, and longitude $76^{\circ} 32' 23.5''$, situated on Parker Island; thence in a straight line across the mouth of Herring Bay to a point defined by latitude $38^{\circ} 43' 40.6''$ and longitude $76^{\circ} 31' 37.8''$, situated on Holland Point; thence following the mean low-water line along the shore of the bay to the southern boundary line of Anne Arundel County in the vicinity of Hog Point.

WATERS CONTIGUOUS TO THE COUNTY.

The oyster-culture laws of Maryland provide that a true and accurate delineation of all natural oyster bars shall be made on copies of 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 "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 the leasing with Anne Arundel County, a boundary line between the waters contiguous to, but not within the territorial limits of Anne Arundel County and the waters contiguous to, but not within the territorial limits of adjacent counties, has been established by the Shell Fish Commission. This boundary line^a has been delineated on the charts of the natural oyster bars published by the Coast and Geodetic Survey and is technically described and defined as follows:

Commencing at a point defined by the intersection of the center line of Brewerton Channel and a straight line between North Point (Old Tower) and a point defined by latitude $39^{\circ} 09' 59.3''$ and longitude $76^{\circ} 28' 39.7''$, situated on Rock Point; thence along the center line of Brewerton Channel and a continuation of the same line to a point defined by latitude $39^{\circ} 09' 10.6''$ and longitude $76^{\circ} 21' 00.0''$, situated about $3\frac{3}{8}$ miles^b east^c of Seven Foot Knoll Light and $3\frac{1}{8}$ miles southeast of Craighill Channel Light (Front Range); thence due south in a straight line to a point defined by latitude $39^{\circ} 03' 30.0''$ and longitude $76^{\circ} 21' 00.0''$, situated about $2\frac{5}{8}$ miles from Baltimore Light, nearly on a straight line between Baltimore Light and Love Point Light; thence in a straight line to a point defined by latitude $39^{\circ} 00' 57.2''$ and longitude $76^{\circ} 21' 34.0''$, situated about $1\frac{3}{8}$ miles east of Sandy Point Light; thence in a straight line to a point defined by latitude $38^{\circ} 53' 56.2''$ and longitude $76^{\circ} 24' 32.0''$, situated about $1\frac{1}{8}$ miles east of Thomas Point Light; thence in a straight line to a point defined by latitude $38^{\circ} 50' 01.1''$ and longitude $76^{\circ} 26' 15.0''$, situated about $2\frac{1}{2}$ miles west of Bloody Point Bar Light; thence in a straight line to a point defined by latitude $38^{\circ} 42' 33.4''$ and longitude $76^{\circ} 27' 40.0''$, situated about $3\frac{3}{8}$ miles east of Hog Point; thence in a straight line to a point defined by the intersection of the mean low-water line of the shore of the bay and the southern boundary line of Anne Arundel County, in the vicinity of Hog Point.

LIMITS OF DREDGING AREA ADJACENT TO CRAIGHILL CHANNEL.

The oyster laws of the State of Maryland define the limits of the area adjacent to Craighill Channel in which dredging for oysters is prohibited, and the boundaries of the natural oyster bars established by the Maryland Shell Fish Commission in that

^aSee progress map at the end of this publication.

^bStatute miles.

^cTrue bearings.

vicinity have been delineated accordingly. The law defining the boundaries of the prohibited area is as follows:

[Code of Maryland, article 72, section 50.]

Any person dragging, raking, or dredging for oysters within five hundred yards of either edge of the channel at the mouth of the Patapsco River, known as the Craighill Channel, extending from Seven Foot Knoll to the mouth of Magothy River, or within five hundred yards of either edge of the cut-off connecting the Brewerton and Craighill channels, shall forfeit his boat or vessel; and it shall be lawful for any justice of the peace of the county or city in which such person shall be arrested to try such person, and on conviction to condemn said boat or vessel and sell the same on five days' notice, and fine the said offender a sum of not less than five dollars, nor more than twenty-five dollars, for each and every offense; and said justice of the peace shall pay over one-half of said fines and forfeitures to the informer, and the other half to the school board of said county or city.

LIST OF NATURAL OYSTER BARS WITHIN DREDGING AREA OF COUNTY.

The natural oyster bars open under the existing laws of Maryland for tonging or dredging, as the case may be, are not so classed and shown on the published charts, as it is a matter more or less subject to change by legislation independent of the oyster-culture laws of Maryland.

However, the Commission in establishing the legal boundaries of the oyster bars have so fixed the limits of certain bars that in every case their boundaries are within or coincident with the boundary line between the tonging and dredging areas. In establishing these boundaries, the Commission have adopted the tonging-dredging limits furnished to them through the courtesy of the Commander of the State Fishery Force.

Most of the natural oyster bars open for dredging are of large area but few in number, and a complete list of the dredging bars in "Anne Arundel County and Adjacent Waters," is given below to facilitate the search of anyone desiring to locate them on the published charts:

- Chart No. 1:
 - Lumps East of Craighill Channel.
 - Bodkin Point North.
 - Bodkin Point South.
 - Mountain Point.
- Chart No. 2:
 - Outer Magothy.
- Chart No. 3:
 - (No dredging area on this chart.)
- Chart No. 4:
 - Bay Shore.

BOUNDARIES OF NATURAL OYSTER BARS.

EXPLANATION OF DESCRIPTIONS OF BOUNDARIES.

The natural oyster bars of Anne Arundel County are 91 in number, and their total area as marked out by buoys placed by the hydrographic engineer of the commission is 33,666 acres. As provided by law, the limits of the oyster bars are all straight lines, but they inclose areas of all shapes from triangles to complicated nine-sided figures, and of all sizes from 4 acres in the rivers to 7,548 acres in the bay.

The sides vary in length from 93 to 7,529 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 10,000 yards from the landmarks most available for the purposes 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 executed, and the magnitude of the work with the consequent need of fixed and uniform methods, has made the problem of describing the boundaries, one of considerable difficulty and importance.

The boundaries of the natural oyster bars of Anne Arundel County, as established by the Shell Fish Commission and delineated on the Coast and Geodetic Survey charts and projections, 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, and that they can be continued, with slight modifications to the end of the work.

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 natural oyster bar to be described, its general locality, and the number of the chart 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 clock-wise direction around the bar; but where a corner of one bar is identical with the corner of one or more other 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 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 the acts of vandals desiring to defeat the purposes of the oyster-culture law.

The fourth and fifth columns, under the general heading of "True bearings"^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

^aThe mean magnetic declination in Anne Arundel County in 1907 was 5° 45' west of north and the annual increase 3'.

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 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,"^a gives the names of the landmarks from which were computed the corresponding "Latitude," "Longitude," "True bearing," and "Distance" of the "Corner of the bar" designated in the first column. A full description of the location and markings of these triangulation stations is given in another part of this publication, under the heading of "Descriptions of landmarks."

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.

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

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

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

^aGeographic positions of these triangulation stations can be obtained by application to the Superintendent of the Coast and Geodetic Survey at Washington.

In the case where there is only one engineer having a single sextant, the three-point method can be used, but not until the two angles determining the position of any buoy have been calculated from the "Forward bearing" given in the tabular forms describing the boundaries of the oyster bars. For example, take "Traces Hollow" bar, described on page —, and assume that "Corner No. 3" is to be examined as to its position. The angle between the two landmarks "Cool" and "Weems," as determined from the forward bearings from this corner, is $101^{\circ} 02'$ and the angle between "Weems" and "Field" is $68^{\circ} 52'$. 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 positions 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 on the three-arm protractor and the actual position of the buoy plotted on the chart by shifting the protractor about until the edges 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 positions 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 placed 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 landmark whose position is 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 on line with the name of the "station" being occupied. The direction thus determined will give one range on which the desired point must be located. The compass can then be moved to a second triangulation station and another range located in a similar manner. The intersection of these two range lines will give the desired point; but in general it should be checked by an additional range line determined from a third station.

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

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 "Description of landmarks" as having a direction of $0^{\circ} 00' 00''$ from the triangulation station being occupied by the transit. The tabular description of the boundaries is next examined and the "back" bearing of the questionable boundary "corner," from the landmark being occupied, is taken out. The angle calculated from the "back" bearing and the bearing given in parentheses alongside the zero landmark in the "Description of landmarks" is then laid 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.

^a The mean magnetic declination for Anne Arundel County (in 1907) is 5° and $45'$ west of north, and the annual increase is $3'$.

Survey of Oyster Bars, Anne Arundel County, Md.

LUMPS EAST OF CRAIGHILL CHANNEL.

(Chesapeake Bay east of Craighill and Cutoff dredged channels—Charts Nos. 1 and 2.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station.
			Forward	Back		
	° ' "	° ' "	° ' "	° ' "	Yards.	
1	39 03 58.04	76 23 18.98	N 67 29 W S 30 18 W S 3 20 E	S 67 31 E N 30 17 E N 3 20 W	3683 4132 6109	Peach Hill. Magothy. Sandy Point Light.
2	39 07 41.00	76 23 18.60	N 30 34 W N 76 32 W S 53 25 W	S 30 35 E S 76 34 E N 53 23 E	3855 3507 4957	Seven Foot Knoll Light. Bodkin Point (Old Tower). Locust.
3	39 10 02.00	76 24 13.95	N 18 31 E N 47 43 W S 26 25 W	S 18 31 W S 47 45 E N 26 24 E	2738 4875 4398	Craighill Channel Light. North Point (Old Tower). Bodkin Point (Old Tower).
4	39 09 06.91	76 21 47.76	N 33 40 W N 84 27 W S 70 16 W	S 33 42 E S 84 28 E N 70 14 E	5352 4366 6159	Craighill Channel Light. Seven Foot Knoll Light. Bodkin Point (Old Tower).
5	38 08 06.00	76 21 00.00	N 32 58 W N 66 08 W S 89 48 W	S 32 59 E S 66 10 E N 89 46 E	7758 6123 7056	Craighill Channel Light. Seven Foot Knoll Light. Bodkin Point (Old Tower).
6	39 05 42.40	76 21 00.00	N 55 39 W N 82 11 W S 73 22 W	S 55 42 E S 82 14 E N 73 20 E	8540 7695 7364	Bodkin Point (Old Tower). Locust. Peach Hill.
7	39 03 58.04	76 22 40.60	N 72 16 W S 40 56 W S 6 08 W	S 72 18 E N 40 55 E N 6 08 E	4631 4721 6136	Peach Hill. Magothy. Sandy Point Light.

BODKIN POINT NORTH.

(Chesapeake Bay off Bodkin Creek—Chart No. 1.)

	° ' "	° ' "	° ' "	° ' "	Yards.	
1	39 08 09.93	76 24 48.59	N 9 45 E S 81 19 W S 22 20 W	S 9 45 W N 81 19 E N 22 20 E	2377 1060 4251	Seven Foot Knoll Light. Bodkin Point (Old Tower). Locust.
2	39 08 12.00	76 25 34.63	S 35 13 E N 25 20 E N 12 02 W	N 35 12 W S 35 21 W S 12 03 E	281 2786 7144	Bodkin Point (Old Tower). Seven Foot Knoll Light. North Point (Old Tower).
3	39 09 17.05	76 25 55.94	S 16 35 E N 87 54 E N 10 59 W	N 16 35 W S 87 54 W S 10 59 E	2528 2173 4884	Bodkin Point (Old Tower). Seven Foot Knoll Light. North Point (Old Tower).
4	39 09 34.25	76 25 38.55	S 5 03 E S 16 16 E N 18 13 W	N 5 02 W N 16 15 W S 18 13 E	3015 1786 4437	Bodkin Point (Old Tower). Seven Foot Knoll Light. North Point (Old Tower).
5	38 08 49.70	76 25 04.52	N 39 20 E N 21 44 W S 22 44 W	S 39 20 W S 21 45 E N 22 43 E	1296 6155 1627	Seven Foot Knoll Light. North Point (Old Tower). Bodkin Point (Old Tower).

HOLLAND POINT.

(Chesapeake Bay, northeast of Holland Point—Chart No. 4.)

Corner of bar	Latitude	Longitude	True bearing		Distance	U. S. C. & G. S. triangulation station.
			Forward	Back		
	° / ' / ''	° / ' / ''	° / ' / ''	° / ' / ''	Yards.	
1	38 43 30.91	76 29 59.52	N 6 06 W	S 6 06 E	9221	Nut.
			N 33 20 W	S 33 21 E	6914	Parker.
			N 82 47 W	S 82 48 E	2617	Holland.
2	38 43 34.30	76 30 59.24	N 3 46 E	S 3 47 W	9074	Nut.
			N 21 26 W	S 21 27 E	6084	Parker.
			N 53 24 W	S 53 25 E	5762	Fairhaven.
3	38 44 04.64	76 32 28.49	S 58 52 W	N 58 52 E	1564	Holland.
			N 1 38 E	S 1 38 W	4641	Parker.
			N 43 15 W	S 43 16 E	3313	Fairhaven.
4	38 45 33.13	76 30 30.77	N 1 45 W	S 1 45 E	5049	Nut.
			N 60 54 W	S 60 55 E	3404	Parker.
			S 25 02 W	N 25 01 E	4179	Holland.
5	38 45 43.72	76 29 41.78	N 17 09 W	S 17 10 E	4908	Nut.
			N 73 04 W	S 73 06 E	4462	Parker.
			S 36 31 W	N 36 30 E	5151	Holland.
6	38 44 36.67	76 29 21.57	N 15 54 W	S 15 55 E	7228	Nut.
			N 53 26 W	S 53 28 E	5977	Parker.
			S 62 18 W	N 62 17 E	4064	Holland.

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

EXPLANATION OF DESCRIPTION OF LANDMARKS.

The oyster-culture laws of Maryland authorizing the survey of natural oyster bars 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 effort 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 description of stations in a uniform and logical manner. The descriptions start with the assumption that the individual seeking the station 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 is known and designated in all work and records executed by the commission. Where the same name is used for two or more stations, as is the case in several instances in Anne Arundel County, the general locality of the station being described is given in parentheses alongside its name.

In the first paragraph, under the heading of "Locality," is given a description of the general locality of the landmark and the serial number of the published chart of the oyster bars of Anne Arundel County which best shows its location. The second paragraph, under this same heading, furnishes the description of the immediate locality of the landmark and refers to the bearing and distance of the 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 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, 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 inter-visibility of triangulation stations 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 showed the necessity of reference marks, if the reestablishment of a new framework of triangulation was to be avoided in the near future.

The marks designated in the descriptions as "the center point of triangle on standard cement monument" are all exactly alike. They are made out 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. All of these monuments have been planted in the same manner, with their tops projecting 3 or 4 inches above the surface of the ground. As the above facts in reference to the "standard cement monuments" are a constant element in all the descriptions, their needless repetition is avoided by this one statement.

It is the expectation that the "reference stations," the character of which is explained above, will be used in the near future in the place of the original 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."^a

^aTo 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.

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 or location of boundaries of oyster bars, these references will be sufficient in many cases, to relocate the "observed station" or "reference station" when both of them have been destroyed but the reference objects remain.

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 $0^{\circ} 00' 00''$, and the directions of all other objects are measured from it as an initial point, the angles being taken in a clockwise direction (left to right).

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

NORTH POINT (OLD TOWER).

Locality.—South of North Point about 150 yards offshore. (See Chart No. 1.)

Marks.—Observed station is center point of lantern on old stone tower formerly used as a light-house.

References.—

"Craighill Channel Light (Front Range)"..... S 81 20 E 2½ miles.

CRAIGHILL CHANNEL LIGHT (FRONT RANGE).

Locality.—Offshore about 2½ miles east by south of North Point and about 4 miles north-north-east of Bodkin Point. (See Chart No. 1.)

Marks.—Observed station is center point of black lantern on brown structure known as Craighill Channel Front Range Light-house.

References.—

"North Point (Old Tower)"..... N 81 19 W 2½ miles.

ROCK POINT.

Locality.—South side of entrance to Rock Creek on Rock Point. (See Chart No. 1.)

Observed station is near the extreme end of point about 70 yards southeast from a small tower and 12 yards from the sea wall.

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

References.—

"Seven Foot Knoll Light" (S 78° 17' E)..... 0 00 00 3¾ miles.
 Bodkin Point (Old Tower)..... 25 43 3¾ miles.
 Tower on east corner..... 194 00 70 yards.
 Outer "White Rocks"..... 211 07 ¾ mile.
 Water tower (opposite shore)..... 291 27 2½ miles.

^a The mean magnetic declination for Anne Arundel County (in 1907) is $5^{\circ} 45'$ west of north, and it is increasing at the rate of $3'$ yearly.

SEVEN FOOT KNOLL LIGHT.

Locality.—Offshore about $1\frac{1}{2}$ miles north-northeast of Bodkin Point and $3\frac{1}{4}$ miles southeast by south of North Point. (See Chart No. 1.)

Marks.—Observed station is center of lantern on brown screw pile structure known as Seven Foot Knoll Light-house.

References.—

"Bodkin Point (Old Tower)".....S 30° 03' W $1\frac{1}{2}$ miles.

BODKIN POINT (OLD TOWER).

Locality.—South side of entrance to Bodkin Creek, on Bodkin Point, about 15 yards east of old stone house. (See Chart No. 1.)

Observed station is on top and at center of old tower formerly used as a light-house.

Marks.—Observed station is center point of a drill hole about 2 inches in diameter and 3 inches deep.

References.—

"Seven Foot Knoll Light"..... N 30° 04' E $1\frac{1}{2}$ miles.

LOCUST.

Locality.—On shore of bay, midway between Bodkin Point Tower and the mouth of Magothy River. Counting down the bay from Bodkin Tower the station is located on the fifth bluff and near the center of it. (See Chart No. 1.)

Observed station is on the top of a bluff 20 feet high. It is 25 feet back from the edge of the bluff and just outside of a large orchard. Cement monument marking reference station is 6.77 meters west of observed station.

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

References.—

"Seven Foot Knoll Light" (N 17° 49' E).....	0	00	00	.....	4 miles.
Farm-house (through trees).....	165	56	..	.....	$\frac{1}{4}$ mile.
REFERENCE STATION.....	242	22	20	.....	6.77 meters.
Nail in blaze on tree.....	249	43	..	.....	6.59 meters.
Nail in blaze on tree (6 inches diameter).....	333	12	..	.....	15.57 meters.
Bodkin Point (Old Tower).....	350	43	..	.....	$2\frac{1}{4}$ miles.

BAY (MAGOTHY RIVER).

Locality.—Magothy River, on north shore of Sillery Bay, about $\frac{1}{2}$ mile west of Long Point and $1\frac{1}{2}$ miles northeast of Dobbins Island. (See Chart No. 1.)

Observed station is on edge of woods, about 2 feet above and 20 feet back from high-water mark. Cement monument marking reference station is 4.55 meters north of observed station.

Marks.—Observed station is a nail in a stub surrounded by a pine box projecting 6 inches above the ground. Reference station is the center point of triangle on standard cement monument.

References.—

"Dobbins" (S 29° 01' W).....	0	00	00	.....	$1\frac{1}{4}$ miles.
Right tangent Dobbins Island.....	9	15	..	.....	$1\frac{1}{2}$ miles.
Right tangent small island.....	19	11	..	.....	$1\frac{1}{4}$ miles.
Nail in blaze on tree (12 inches diameter).....	112	15	..	.....	6.98 meters.
REFERENCE STATION.....	149	19	10	.....	4.55 meters.
Nail in blaze on tree (12 inches diameter).....	232	53	..	.....	9.41 meters.
Right tangent Gibson Island.....	326	53	..	.....	$1\frac{1}{2}$ miles.

Survey of Oyster Bars, Anne Arundel County, Md.

101

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

References.—

	°	'	"	
"Fairhaven" (S 27° 28' W).....	0	00	00	1¼ miles.
Chimney on small house (opposite shore)....	16	25	..	¼ mile.
South chimney on white house (opposite shore).....	93	21	..	¼ mile.
South chimney on yellow house (opposite shore).....	102	00	..	¼ mile.
REFERENCE STATION.....	105	44	35	5.15 meters.
West chimney on small white house.....	124	37	..	150 yards.
Northwest corner of house.....	172	19	..	16.39 meters.
Southwest corner of house.....	192	11	..	15.17 meters.

FAIRHAVEN.

Locality.—Western shore of Herring Bay on prominent bold hill about ¼ mile back from shore and ¾ mile west by north of Fairhaven wharf. (See Chart No. 4.)

Observed station is about 25 yards south of a lone chestnut tree 3 feet in diameter and about 100 yards north of highway to Friendship. Cement monument marking reference station is 6.08 meters north of observed station.

Marks.—Observed station is the center of a 4-inch tile pipe with top 8 inches below the surface. Reference station is center point of triangle on standard cement monument.

References.—

	°	'	"	
"Hopkins" (N 27° 28' E).....	0	00	00	1¼ miles.
Cupola on old Fairhaven Hotel.....	45	44	..	½ mile.
East chimney on yellow house.....	51	06	..	½ mile.
West peak of Fairhaven wharf house.....	98	49	..	1 mile.
Chimney on small house close to shore.....	113	25	..	½ mile.
Post of rail fence.....	241	05	..	14.53 meters.
Nail in blaze on lone chestnut tree (3 feet diameter).....	346	37	..	25.78 meters.
REFERENCE STATION.....	351	49	50	6.08 meters.

HOLLAND.

Locality.—Western shore of bay on south side of entrance to Herring Bay about 30 yards west of Holland Point. (See Chart No. 4.)

Observed station is 5 feet back from top of a bank 7 feet high. Two large blazed trees stand south and west of station at distance 12 and 25 yards respectively. Cement monument marking reference station is 12.88 meters southwest 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.—

	°	'	"	
"Fairhaven" (N 48° 13' W).....	0	00	00	2½ miles.
Nail in blaze on red oak tree (2½ feet diameter).....	238	49	..	11.17 meters.
REFERENCE STATION.....	262	05	00	12.88 meters.
Nail in blaze on red oak tree (2½ feet diameter).....	286	55	..	22.63 meters.

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" of the representative of the Survey. 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 natural oyster bars. The "free hand" permitted by these orders proved very beneficial and was 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.

HOUSE BOAT "OYSTER."

While arranging to turn over the command of the steamer *Endeavor*, the representative of the Survey, acting under preliminary instructions from the Superintendent, was engaged in frequent consultation with the Shell Fish Commissioners in reference to the programme of future work. In addition to these duties, he undertook for the commissioners the planning and supervision necessary to convert the old side-wheel steamer *Thomas L. Worthley* into a house boat for the surveying parties of both the Commission and the Government.

^a For copies of these laws see "Introduction" to this publication.

The *Worthley*, now called the house boat *Oyster*, was in excellent condition when purchased by the Commission. The keelsons and timbers were sound and the upper works strong. After the removal of the old engine and boiler, the house boat was docked and her hull thoroughly examined. The outside planking below the water line was found in good condition, and although it was recalced, it was done as an additional precaution, the hull having been absolutely water-tight from the day of purchase.

The *Oyster* is about 135 feet over all and 35 feet in beam. The main deck contains living quarters for 27 men, the officers mess room and the galley. The upper deck has 11 staterooms, 5 for the 3 commissioners and their 2 hydrographic engineers, 4 for the Coast Survey officers, 1 for the representative of the U. S. Bureau of Fisheries, and 1 for the local county oyster commissioner. Besides these rooms, there are located on this deck a large drafting room, a laboratory for oyster investigations, and an office room. Coal for the two Government launches and the galley is stored in the hold, which also contains fresh-water tanks having a capacity of about 7,000 gallons. Signal lumber is carried on the main deck aft of the officers' mess room.

As a whole, the *Oyster* is plainly and practically equipped for the work to be done. She has added much to the amount of the surveying accomplished during the season, and the Coast and Geodetic Survey representative greatly appreciates the practical advantages furnished to his party by their quarters on the house boat. When the large party of the combined surveying forces is taken into consideration with the limited accommodations usually obtainable on shore, the attending difficulties of a scattered party, the uncertain location and supply of coal and water for launches and sufficient lumber for signals, it is easily to be seen that the amount of work accomplished would have been reduced greatly, if there had been no such house boat as the *Oyster* to supply all requirements of the surveying operations.

With reasonable care and repairs, the *Oyster* will be a valuable asset to the Commission at the completion of the oyster survey of the State, besides having paid her first cost several times over in both quality and quantity of work accomplished.

ORGANIZATION AND EQUIPMENT.

The command of the *Endeavor* was turned over to the hydrographic inspector July 9, 1906, and from that date to the commencement of active field work the Survey representative was engaged on organization of party, collection of surveying data, general supervision of the construction of the house boat, and preparation of field equipment.

Some delay was experienced in completing repairs to the Survey steam launch *Inspector*, and by the difficulties of obtaining surveying assistants who were qualified to receive an appointment under civil-service rules. In fact, the last field assistant did not take his oath of office until the middle of October.

The field organization of the party, when fully completed, remained the same during the season, and was as follows:

- C. C. Yates, assistant, Coast and Geodetic Survey, and chief of party.
- E. A. Borst, triangulator.
- N. L. Arbuckle, topographic draftsman.
- F. W. Seth, surveyman and computer.
- One launch coxswain.
- One launch engineer.
- Five seamen and hands.

Later two additional draftsmen, J. D. Torrey and G. C. Moore, were appointed and assigned to duty in the office in Washington, where they were employed on the preparation for publication of the charts of natural oyster bars, making in all a party of six officers from the Coast and Geodetic Survey engaged on the work. During the last weeks of the field work, Mr. Paul C. Whitney, assistant, Coast and Geodetic Survey, was assigned to temporary duty in the party in place of Mr. E. A. Borst, who resigned.

The equipment of the party, in addition to the quarters and accommodations on the house boat *Oyster*, consisted of the large Coast and Geodetic Survey steam launch *Inspector*, an excellent whaleboat, a large ship's cutter, and a fishing dory. The Survey also furnished a complete outfit of theodolites, levels, sextants, and other instruments necessary for the work of the Government and State surveying parties, and the usual outfit of tools, sails and oars, stationery, etc.

FIELD WORK.

The launch *Inspector* and outfit were moved to Annapolis on August 10, 1906, on which date the actual field work of the Coast and Geodetic Survey party commenced.

Previous to this time a number of signals had been erected over old Coast and Geodetic Survey triangulation stations on the Severn River by the hydrographic engineer of the Commission. By using the triangulation so established, considerable oyster bar location was accomplished.

After the arrival of the Coast Survey party, the erection of signals and the observations of horizontal angles necessary to establish a framework of triangulation were kept well ahead of the oyster bar locations and other oyster investigations.

The methods of triangulation were those established by the Coast and Geodetic Survey and require no explanation other than that given by the publications of the Survey.

In all there are 123 triangulation stations involved in the survey of Anne Arundel County natural oyster bars. These stations are scattered along the western shore line of the bay from Fort Carroll to Holland Point, and are located at intervals frequently less than a half and rarely more than a mile apart. The triangulation was carried on with energy and good judgment, but the scattered condition of the work, composed of a mixture of new and old stations, increased the number of observations without the usual proportionate increase in number of new stations established.

After the appointment of a topographic draftsman on September 19, all boat sheets for both the hydrographic and oyster investigation parties were prepared and much other drafting work was done to facilitate the operations of the commissioners. Besides this work, the draftsman checked the computations and kept up the smooth projections as far as the new field work permitted.

Considerable difficulty was experienced in bringing up the computations to the immediate requirements of the work, especially in West River and to the south along the shore of the bay, where practically all old triangulation stations had been washed away. This situation was much relieved by the appointment of a surveyman on October 15, who had received some training in the computing division of the Survey at Washington.

The operations in the vicinity of Severn and South rivers were completed September 13, when the house boat *Oyster* was moved to West River. Up to this time the party had lived on shore and suffered many of the resulting inconveniences and delays due to scattered lodgings, uncertain meal hours, etc. The advantages of the house boat were immediately shown in the results, and in spite of much bad weather the work in the vicinity of West River was completed and the *Oyster* moved to Magothy River on November 9. Here the house boat remained until the end of the month, when she was moved to Bodkin Creek. On December 9 the main body of the field work for the season was completed and the *Oyster* went to Annapolis for the winter. Quarters were taken up on shore, the parties reduced in number, and offices established in the state house.

During the following winter the unfinished ends of triangulation, construction and planting of permanent monuments, and new descriptions of stations, occupied about a third of the time of the triangulator.

Besides the training and assistance required by an entirely new organization, and the systematizing of a new class of work, the representative of the Coast and Geodetic Survey devoted much time and took much interest in the work of the Commission in general as affecting both the surveying and other operations of the oyster-culture laws of Maryland.

OFFICE WORK.

After October 15, a greater part of the original computations were made by the surveyman of the party and were checked by the triangulator and the topographic draftsman. This work included the computations of 166 triangles, 67 geodetic positions, and 1,083 back computations of geodetic positions required for the technical descriptions of the boundaries of natural oyster bars. These computations, together with the making out of the abstract of horizontal angles, the lists of geographic positions, the lists of directions, and the reduction to center for 8 eccentric stations, make up a creditable amount of computation for the short season's work.

The drafting consisted of the preparation of nearly all boat sheets used by the hydrographic and oyster-investigation parties, the construction of 9 projection sheets, and the plotting of 2,596 sextant positions on the projections. Besides this drafting, the progress map was prepared for the lithographer, the boundaries of 91 natural oyster bars were plotted on the projections, the geographic positions of 361 corners of bars were scaled off the sheets, and 1,083 distances to landmarks from corners of bars taken off the projections for use in checking computations. This work was done neatly and accurately, and represents a larger amount of labor than this statement would indicate.

The great amount of necessary work required to prepare for publication the 4 large scale charts of the natural oyster bars and the report containing the description of boundaries and landmarks to accompany charts, can be seen from an inspection of the charts and reports.

SUMMARY.

The results obtained from the work of the Coast and Geodetic Survey in cooperation with the Maryland Shell Fish Commission need no other summary than is indicated by the published charts of the natural oyster bars and the scheme of

projections and triangulation shown on the progress map at the end of this report.

The work completed will stand the test of time, and it will be recognized ultimately that both time and money have been saved by having the work done systematically and accurately.

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.

Before ending this report the representative of the Coast and Geodetic Survey deems it both desirable and natural to make a statement of appreciation of the ever courteous actions of everyone connected with the Maryland Shell Fish Commission^a and of his colleague^b from the Department of Commerce and Labor. This excellent relationship made true cooperation possible and aided greatly in the successful accomplishment of much work.

^a Walter J. Mitchell, chairman, Dr. Caswell Grave, secretary, Benjamin K. Green, treasurer, commissioners; Thomas H. Robinson, counsel; Swepson Earle, hydrographic engineer; W. Gibson Emory, assistant engineer; Joseph E. Smith, local oyster commissioner for Anne Arundel County; H. Courtney Jenifer, chief clerk; Samuel A. Harper, clerk; Ernest Reppenhagen, draftsman.

^b Dr. H. F. Moore, scientific assistant in the U. S. Bureau of Fisheries.

35° 76° 30' 25' 20'

COAST AND GEODETIC SURVEY
PROGRESS MAP
ANNE ARUNDEL COUNTY
MARYLAND

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

1906-07

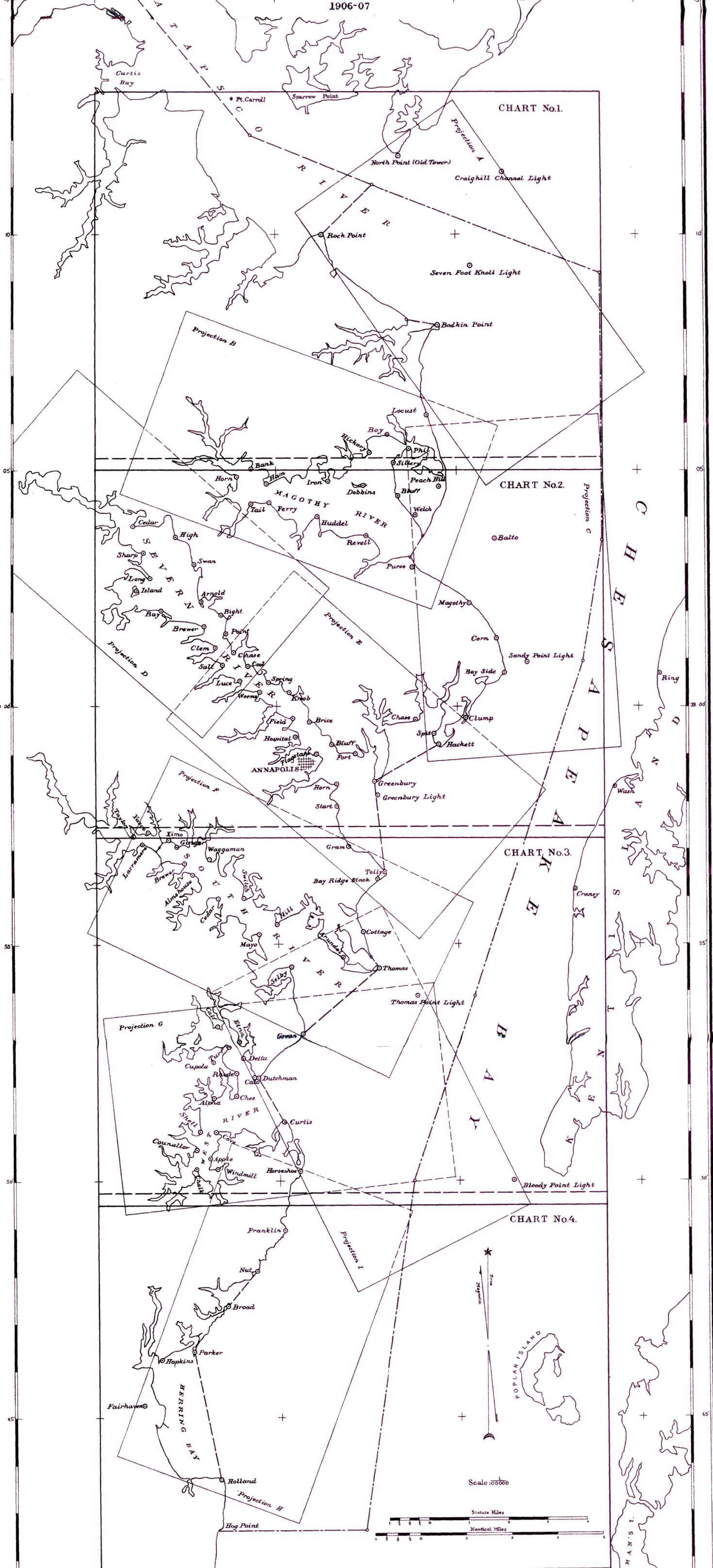


CHART No. 1

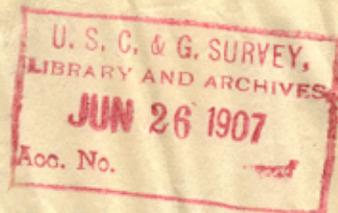
CHART No. 2

CHART No. 3

CHART No. 4

- 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

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STATISTICS OF HYDROGRAPHY
resulting from

SURVEY OF OYSTER BARS

by

UNITED STATES COAST AND GEODETIC SURVEY

in cooperation with

MARYLAND SHELL FISH COMMISSION

in

ANNE ARUNDEL COUNTY

MARYLAND

1906-1907

NOTE: The primary object of the work covered by these statistics, was the furnishing of information for the purposes of the "Oyster Survey". Consequently, the hydrography does not necessarily fulfill all the requirements of customary hydrographic operations.

In general, the lines of soundings only cover the area of the natural oyster bars as indicated on the projections; and therefore, it will be useless to plot up a sheet for hydrographic information unless the waters in question are included in these oyster bar boundaries. (See "Explanation" on next page)

(See Descriptive Report for scheme of Projections.)

EXPLANATION

These statistics cover all hydrography executed in connection with the "Oyster Survey" in Anne Arundel County and adjacent waters of Maryland. All this work is contained in the sounding and tidal records in the Archives of the Survey, but only a part of it has been plotted on the projections forwarded on the same date. For purposes of an index to the hydrographic work, the boundary lines of oyster bars as shown on charts of oyster bars of "Anne Arundel County and Adjacent Waters" published by the Survey, indicate very closely the area covered by soundings. Hence, it will not be necessary to plot up any of the hydrography covered by these statistics, UNLESS IT IS DESIRED TO INVESTIGATE THE WATERS INCLUDED IN THE OYSTER BOUNDARY LINES AS SHOWN ON THE PUBLISHED CHARTS OF OYSTER BARS.

The following tables are self explanatory except as to column 2 and 3.

The second column (under heading C. & G. S. Day Letter) gives the day letter as customarily used in the Survey, but the different colors, stated in parenthesis at the head of the column, indicate different series of alphabets, not different sounding boats. The third column (under heading of M. S. F. C. Book Letter) gives the book letter of the Maryland Shell Fish Commission. This was adopted by the M. S. F. C. for purposes of their own. It really has no meaning except as an additional symbol for the Vol. No. given in the 4th column. In this connection, attention is called to the fact that there are two sets of angle numbers in the sounding records. The ones in black pencil are peculiar to the book letter system described above, and occupy the ordinary position of day angle numbers. The ones in colored pencil are the day angle numbers of the C. & G. S. and they occupy the column in the sounding record headed up "Boat head by Compass".

These colored numbers correspond to such positions as were plotted on the projections, and are the ones that should be used in any future plotting that may be done on the sheets.

Attention is also called to another feature of the sounding records:- In the columns under heading of "Remarks" one of the capital letters B, S, or D, occur opposite each sounding. These letters refer to the indications of the oyster shell character of the bottom as shown by vibration of a wire to which is attached a chain dragging over the bottom. This chain causes the wire to vibrate in proportion to the number of shells it is passing over, and the observer with his hand on wire calls out at each sounding, the character of bottom the vibrations indicate. For no vibrations the words "barren of shells" are used (B); occasional vibrations are named "scattering shells" (S); and continuous vibrations and jerks are named "dense shells" (D).

In addition to the usual contents of the tabular statistics, there has been added a column under the heading "Tide Vol. No.," which gives the "series number" of the tide record volume of Anne Arundel County used in the reduction of soundings of the corresponding date and sounding record of the same line. These volume numbers are given on the bottom of the tabs of the tidal volumes and are in addition to the customary number which indicates merely the volumes of tidal observations at one particular station.

The following table shows the relation between the customary station number of the Tide Record Volumes and the "series number" given in these statistics.

<u>Date</u>	<u>Locality</u>	<u>Tide Gauge</u>	<u>Serial No.</u> (Statistics)	<u>Vol.No.</u> (archives)
July 19 to Aug. 16	Severn River	Naval Academy Whf.	I	1.
Aug. 17 " " 23	" "	" " "	II	2
" 24 " Sept. 10	Entrance Severn R.	Greenbury Pt. L.H.	III	1
Sept. 10 " Oct. 10	Off Thomas Pt.	Thomas Pt. L. H.	IV	1
Oct. 11 " Nov. 3	" " "	" " " "	V	2
" 15 " Nov. 3	Chesapeake Bay	Bloody Pt. L.H.	VI	1
Nov. 9 " Dec. 6	Entrance Patapsco R.	Seven Ft. Knoll	VII	1

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
July 19	(red) a	A	I	58	570	6.1	E	I
" 20	b	A	I	89	897	8.1	E	I
" 21	c	A	I	43	445	3.6	E	I
" 23	d	A	I	5	25	0.3	E	I
" 25	e	A-B	I-II	57	364	4.0	E	I
" 26	f	B	II	63	630	6.2	E	I
" 27	g	B	II	65	705	4.9	E	I
" 28	h	B	II	27	256	2.4	E	I
" 30	i	B	II	38	318	3.6	E	I
" 31	j	C	III	88	799	7.5	E	I
Aug. 1	k	C	III	26	238	2.1	E	I
" 3	l	C	III	82	713	7.0	E	I
" 4	m	C	III	28	214	1.8	E	I
" 6	n	D	IV	87	876	8.4	E	I
" 15	o	D	IV	80	727	5.4	D	I
" 16	p	D-E	IV-V	86	697	6.2	D	I
" 17	q	E	V	35	280	2.6	E	II
" 21	r	E	V	51	412	4.4	D	II
" 23	s	E	V	80	536	6.7	C,E	II
" 24	t	F	VI	38	245	2.9	C	III
" 28	u	F	VI	26	142	1.7	C,E	III
" 30	v	F	VI	106	715	10.1	C	III
" 31	w	F	VI	56	335	5.2	C	III
Sept. 4	x	G	VII	71	637	7.5	F	III
" 5	y	G	VII	81	706	8.1	F	III
" 6	z	G-H	VII-VIII	104	910	9.0	F	III

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
Sept. 7	(blue) a	H	VIII	109	1012	11.3	I	III
" 10	b	H-I	VIII-IX	88	819	9.2	F	III & IV
" 13	c	I	IX	44	463	5.2	I	IV
" 17	d	I	IX	39	362	3.5	F	IV
" 18	e	I	IX	59	511	5.2	F	IV
" 19	f	I-K	IX-X	96	841	7.6	F	IV
" 20	g	K	X	96	841	6.3	F	IV
" 21	h	K-L	X-XI	138	1122	12.1	I	IV
" 22	i	L	XI	50	448	4.0	I	IV
" 24	j	L	XI	21	213	2.0	G,I	IV
" 25	k	L-M	XI-XII	88	671	5.2	F	IV
" 26	l	M	XII	77	561	5.1	G	IV
" 27	m	M	XII	31	293	3.3	I	IV
" 28	n	M	XII	77	522	4.7	G	IV
" 29	o	M-N	XII-XIII	41	426	3.7	I	IV
Oct. 2	p	N	XIII	64	432	5.1	G	IV
" 3	q	N	XIII	64	440	5.1	G	IV
" 5	r	N-O	XIII-XIV	125	1063	12.0	I	IV
" 10	s	O	XIV	20	143	1.5	F,I	IV
" 12	t	O	XIV	78	585	6.3	F	V
" 13	u	O	XIV	12	54	0.1	I	V
" 19	v	O	XIV	55	398	5.6	I	V & VI
" 23	w	O	XIV	26	194	2.4	I	V & VI
" 25	x	P	XV	155	1113	13.6	H	V & VI
" 26	y	P	XV	114	771	11.5	H	V & VI
" 29	z	Q	XVI	34	247	3.6	H	V & VI

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. NO.
Oct. 30	(green) a	Q	XVI	156	922	15.5	H	V & VI
Nov. 2	b	Q-R	XVI-XVII	141	972	12.8	H	V & VI
" 3	c	R	XVII	8	56	0.9	I	V & VI
" 9	d	R	XVII	96	568	8.2	C	VII
" 10	e	R	XVII	33	258	3.3	C	VII
" 13	f	R	XVII	20	154	1.7	C	VII
" 14	g	S	XVIII	122	793	10.3	C	VII
" 16	h	S	XVIII	42	240	2.6	B	VII
" 17	i	S	XVIII	65	400	4.4	B	VII
" 19	j	S	XVIII	44	300	3.2	B	VII
" 20	k	T	XIX	32	248	2.4	B	VII
" 21	l	T	XIX	11	103	1.2	B	VII
" 22	m	T	XIX	80	456	7.8	A,C	VII
" 23	n	T	XIX	75	449	7.3	A	VII
" 24	o	T	XIX	44	313	2.9	B	VII
" 26	p	U	XX	61	407	4.9	B	VII
" 27	q	U	XX	52	376	4.7	C	VII
" 28	r	U	XX	18	85	1.4	C	VII
" 30	s	U	XX	106	954	13.4	A	VII
Dec. 1	t	V	XXI	33	197	3.2	A	VII
" 4	u	V	XXI	54	351	5.3	A	VII
" 5	v	V	XXI	105	833	16.2	A,C	VII

These colored numbers correspond to such positions as were plotted on the projections, and are the ones that should be used in any future plotting that may be done on the sheets.

Attention is also called to another feature of the sounding records:- In the columns under heading of "Remarks" one of the capital letters B, S, or D, occur opposite each sounding. These letters refer to the indications of the oyster shell character of the bottom as shown by vibration of a wire to which is attached a chain dragging over the bottom. This chain causes the wire to vibrate in proportion to the number of shells it is passing over, and the observer with his hand on wire calls out at each sounding, the character of bottom the vibrations indicate. For no vibrations the words "barren of shells" are used (B); occasional vibrations are named "scattering shells" (S); and continuous vibrations and jerks are named "dense shells" (D).

In addition to the usual contents of the tabular statistics, there has been added a column under the heading "Tide Vol. No.," which gives the "series number" of the tide record volume of Anne Arundel County used in the reduction of soundings of the corresponding date and sounding record on the same line. These volume numbers are given on the bottom of the tables of the tidal volumes and are in addition to the customary number which indicates merely the volumes of tidal observations at one particular station.

The following table shows the relation between the customary station number of the Tide Record Volumes and the "series number" given in these statistics,

<u>Date</u>	<u>Locality</u>	<u>Tide Gauge</u>	<u>Serial No.</u> (Statistics)	<u>Vol.No.</u> (archives)
July 19 to Aug. 16	Severn River	Naval Academy Whf.	I	1
Aug. 17 " " 23	" "	" " "	II	2
" 24 " Sept. 10	Entrance Severn R.	Greenbury Pt. L.H.	III	1
Sept. 10 " Oct. 10	Off Thomas Pt.	Thomas Pt. L. H.	IV	1
Oct. 11 " Nov. 3	" " "	" " " "	V	2
" 15 " Nov. 3	Chesapeake Bay	Bloody Pt. L.H.	VI	1
Nov. 9 " Dec. 6	Entrance Patapsco R.	Seven Ft. Knoll	VII	1

Date	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
2881 July 19	a	A	I	58	570	6.1	E	I
2881 " 20	b	A	I	89	897	8.1	E	I
2881 " 21	c	A	I	43	445	3.6	E	I
2881 " 23	d	A	I	5	25	0.3	E	I
2881 " 25	e	A-B	I-II	57	364	4.0	E	I
2881 " 26	f	B	II	63	630	6.2	E	I
2881 " 27	g	B	II	65	705	4.9	E	I
2881 " 28	h	B	II	27	256	2.4	E	I
2881 " 30	i	B	II	38	318	3.6	E	I
2881 " 31	j	C	III	88	799	7.5	E	I
2881 Aug. 1	k	C	III	26	238	2.1	E	I
2881 " 3	l	C	III	82	713	7.0	E	I
2881 " 4	m	C	III	28	214	1.8	E	I
2881 " 6	n	D	IV	87	876	8.4	E	I
" 15	o	D	IV	80	727	5.4	D	I
" 16	p	D-E	IV-V	86	687	6.2	D	I
2881 " 17	q	E	V	35	280	2.6	E	II
" 21	r	E	V	51	412	4.4	D	II
" 23	s	E	V	80	536	6.7	C,E	II
" 24	t	F	VI	38	245	2.9	C	III
" 28	u	F	VI	26	142	1.7	C,E	III
" 30	v	F	VI	106	715	10.1	C	III
" 31	w	F	VI	56	335	5.2	C	III
Sept. 4	x	G	VII	71	637	7.5	F	III
" 5	y	G	VII	91	706	8.1	F	III
" 6	z	G-H	VII-VIII	104	910	9.0	F	III

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
Sept. 7	(blue) a	H	VIII	109	1012	11.3	I	III
" 10	b	H-I	VIII-IX	88	819	9.2	F	III & IV
" 13	c	I	IX	44	463	5.2	I	IV
" 17	d	I	IX	39	362	3.5	F	IV
" 18	e	I	IX	59	511	5.2	F	IV
" 19	f	I-K	IX-X	96	841	7.6	F	IV
" 20	g	K	X	96	841	6.3	F	IV
" 21	h	K-L	X-XI	138	1122	12.1	I	IV
" 22	i	L	XI	50	448	4.0	I	IV
" 24	j	L	XI	21	213	2.0	G,I	IV
" 25	k	L-M	XI-XII	88	671	5.2	F	IV
" 26	l	M	XII	77	561	5.1	G	IV
" 27	m	M	XII	31	293	3.3	I	IV
" 28	n	M	XII	77	522	4.7	G	IV
" 29	o	M-N	XII-XIII	41	426	3.7	I	IV
Oct. 2	p	N	XIII	64	432	5.1	G	IV
" 3	q	N	XIII	64	440	5.1	G	IV
" 5	r	N-O	XIII-XIV	125	1063	12.0	I	IV
" 10	s	O	XIV	20	143	1.5	F,I	IV
" 12	t	O	XIV	78	585	6.3	F	V
" 13	u	O	XIV	12	54	0.1	I	V
" 19	v	O	XIV	55	398	5.6	I	V & VI
" 23	w	O	XIV	26	194	2.4	I	V & VI
" 25	x	P	XV	155	1113	13.6	H	V & VI
" 26	y	P	XV	114	771	11.5	H	V & VI
" 29	z	Q	XVI	34	247	3.6	H	V & VI

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
Oct. 30	(green) a	Q	XVI	156	922	15.5	H	V & VI
Nov. 2	b	Q-R	XVI-XVII	141	972	12.8	H	V & VI
" 3	c	R	XVII	8	56	0.9	I	V & VI
" 9	d	R	XVII	96	568	8.2	C	VII
" 10	e	R	XVII	33	258	3.3	C	VII
" 13	f	R	XVII	20	154	1.7	C	VII
" 14	g	S	XVIII	122	793	10.3	C	VII
" 16	h	S	XVIII	42	240	2.6	B	VII
" 17	i	S	XVIII	65	400	4.4	B	VII
" 19	j	S	XVIII	44	300	3.2	B	VII
" 20	k	T	XIX	32	248	2.4	B	VII
" 21	l	T	XIX	11	103	1.2	B	VII
" 22	m	T	XIX	80	456	7.8	A,C	VII
" 23	n	T	XIX	75	449	7.3	A	VII
" 24	o	T	XIX	44	313	2.9	B	VII
" 26	p	U	XX	61	407	4.9	B	VII
" 27	q	U	XX	52	376	4.7	C	VII
" 28	r	U	XX	18	85	1.4	C	VII
" 30	s	U	XX	106	954	13.4	A	VII
Dec. 1	t	V	XXI	33	197	5.2	A	VII
" 4	u	V	XXI	54	351	5.3	A	VII
" 5	v	V	XXI	105	833	16.2	A,C	VII

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U. S. C. & G. SURVEY,
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STATISTICS OF HYDROGRAPHY
resulting from

SURVEY OF OYSTER BARS

by

UNITED STATES COAST AND GEODETIC SURVEY

in cooperation with

MARYLAND SHELL FISH COMMISSION

in

ANNE ARUNDEL COUNTY

MARYLAND

1906-1907

NOTE: The primary object of the work covered by these statistics, was the furnishing of information for the purposes of the "Oyster Survey". Consequently, the hydrography does not necessarily fulfill all the requirements of customary hydrographic operations.

In general, the lines of soundings only cover the area of the natural oyster bars as indicated on the projections; and therefore, it will be useless to plot up a sheet for hydrographic information unless the waters in question are included in these oyster bar boundaries. (See "Explanation" on next page)

(See Descriptive Report for scheme of Projections.)

EXPLANATION

These statistics cover all hydrography executed in connection with the "Oyster Survey" in Anne Arundel County and adjacent waters of Maryland. All this work is contained in the sounding and tidal records in the Archives of the Survey, but only a part of it has been plotted on the projections forwarded on the same date. For purposes of an index to the hydrographic work, the boundary lines of oyster bars as shown on charts of oyster bars of "Anne Arundel County and Adjacent Waters" published by the Survey, indicate very closely the area covered by soundings. Hence, it will not be necessary to plot up any of the hydrography covered by these statistics, UNLESS IT IS DESIRED TO INVESTIGATE THE WATERS INCLUDED IN THE OYSTER BOUNDARY LINES AS SHOWN ON THE PUBLISHED CHARTS OF OYSTER BARS.

The following tables are self explanatory except as to columns 2 and 3.

The second column (under heading C. & G. S. Day Letter) gives the day letter as customarily used in the Survey, but the different colors, stated in parenthesis at the head of the column, indicate different series of alphabets not different sounding boats. The third column (under heading of M.S.F.C. Book Letter) gives the book letter of the Maryland Shell Fish Commission. This was adopted by the M.S.F.C. for purposes of their own. It really has no meaning except as an additional symbol for the Vol. No. given in the 4th column. In this connection, attention is called to the fact that there are two sets of angle numbers in the sounding records. The ones in black pencil are peculiar to the book letter system described above, and occupy the ordinary position of day angle numbers. The ones in colored pencil are the day angle numbers of the C. & G. S. and they occupy the column in the sounding record headed up "Boat head by Compass".

These colored numbers correspond to such positions as were plotted on the projections, and are the ones that should be used in any future plotting that may be done on the sheets.

Attention is also called to another feature of the sounding records:- In the columns under heading of "Remarks" one of the capital letters B. S. or D. occur opposite each sounding. These letters refer to the indications of the oyster shell character of the bottom as shown by vibration of a wire to which is attached a chain dragging over the bottom. This chain causes the wire to vibrate in proportion to the number of shells it is passing over, and the observer with his hand on wire calls out at each sounding, the character of bottom the vibrations indicate. For no vibrations the words "barren of shells" are used (B); occasional vibrations are named "scattering shells" (S); and continuous vibrations and jerks are named "dense shells" (D).

In addition to the usual contents of the tabular statistics, there has been added a column under the heading "Tide Vol. No.," which gives the "series number" of the tide record volume of Anne Arundel County used in the reduction of soundings of the corresponding date and sounding record on the same line. These volume numbers are given on the bottom of the tables of the tidal volumes and are in addition to the customary number which indicates merely the volumes of tidal observations at one particular station.

The following table shows the relation between the customary station number of the Tide Record Volumes and the "series number" given in these statistics.

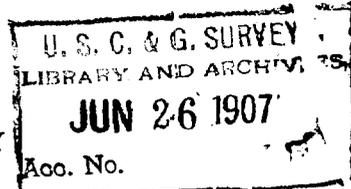
<u>Date</u>	<u>Locality</u>	<u>Tide Gauge</u>	<u>Serial No.</u> (Statistics)	<u>Vol.No.</u> (archives)
July 19 to Aug. 16	Severn River	Naval Academy Whf.	I	1
Aug. 17 " " 23	" "	" " "	II	2
" 24 " Sept. 10	Entrance Severn R.	Greenbury Pt. L.H.	III	1
Sept. 10 " Oct. 10	Off Thomas Pt.	Thomas Pt. L. H.	IV	1
Oct. 11 " Nov. 3	" " "	" " " "	V	2
" 15 " Nov. 3	Chesapeake Bay	Bloody Pt. L.H.	VI	1
Nov. 9 " Dec. 6	Entrance Patapsco R.	Seven Ft. Knoll	VII	1

Date 1906	C. & G.S. Day Letter	H.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
July 19	(red) a	A	I	58	570	6.1	E	I
" 20	b	A	I	89	897	8.1	E	I
" 21	c	A	I	43	445	3.6	E	I
" 23	d	A	I	5	25	0.3	E	I
" 25	e	A-B	I-II	57	364	4.0	E	I
" 26	f	B	II	63	630	6.2	E	I
" 27	g	B	II	65	705	4.9	E	I
" 28	h	B	II	27	256	2.4	E	I
" 30	i	B	II	38	318	3.6	E	I
" 31	j	C	III	88	799	7.5	E	I
Aug. 1	k	C	III	26	238	2.1	E	I
" 3	l	C	III	82	713	7.0	E	I
" 4	m	C	III	28	214	1.6	E	I
" 6	n	D	IV	87	876	8.4	E	I
" 15	o	D	IV	80	727	5.4	D	I
" 16	p	D-E	IV-V	86	687	6.2	D	I
" 17	q	E	V	35	280	2.6	E	II
" 21	r	E	V	51	412	4.4	D	II
" 23	s	E	V	80	536	6.7	C,E	II
" 24	t	F	VI	38	245	2.9	G	III
" 28	u	F	VI	26	142	1.7	C,E	III
" 30	v	F	VI	106	715	10.1	G	III
" 31	w	F	VI	56	335	5.2	G	III
Sept. 4	x	G	VII	71	637	7.5	F	III
" 5	y	G	VII	81	706	8.1	F	III
" 6	z	G-H	VII-VIII	104	910	9.0	F	III

Date 1906	G. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
Sept. 7	(blue) a	H	VIII	109	1012	11.3	I	III
" 10	b	H-I	VIII-IX	88	819	9.2	F	III & IV
" 13	c	I	IX	44	463	5.2	I	IV
" 17	d	I	IX	39	362	3.5	F	IV
" 18	e	I	IX	59	511	5.2	F	IV
" 19	f	I-K	IX-X	96	841	7.6	F	IV
" 20	g	K	X	96	841	6.3	F	IV
" 21	h	K-L	X-XI	138	1122	12.1	I	IV
" 22	i	L	XI	50	448	4.0	I	IV
" 24	j	L	XI	21	213	2.0	G, I	IV
" 25	k	L-M	XI-XII	88	671	5.2	F	IV
" 26	l	M	XII	77	561	5.1	G	IV
" 27	m	M	XII	31	293	3.3	I	IV
" 28	n	M	XII	77	522	4.7	G	IV
" 29	o	M-N	XII-XIII	41	426	3.7	I	IV
Oct 2	p	N	XIII	64	432	5.1	G	IV
" 3	q	N	XIII	64	440	5.1	G	IV
" 5	r	N-O	XIII-XIV	125	1063	12.0	I	IV
" 10	s	O	XIV	20	143	1.5	F, I	IV
" 12	t	O	XIV	78	585	6.3	F	V
" 13	u	O	XIV	12	54	0.1	I	V
" 19	v	O	XIV	55	398	5.6	I	V & VI
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" 29	z	Q	XVI	34	247	3.6	H	V & VI

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
Oct. 30	(green) a	Q	XVI	156	922	15.5	H	V & VI
Nov. 2	b	Q-R	XVI-XVII	141	972	12.8	H	V & VI
" 3	c	R	XVII	8	56	0.9	I	V & VI
" 9	d	R	XVII	96	568	8.2	C	VII
" 10	e	R	XVII	33	258	3.3	C	VII
" 13	f	R	XVII	20	154	1.7	C	VII
" 14	g	S	XVIII	122	793	10.3	C	VII
" 16	h	S	XVIII	42	240	2.6	B	VII
" 17	i	S	XVIII	65	400	4.4	B	VII
" 19	j	S	XVIII	44	300	3.2	B	VII
" 20	k	T	XIX	32	248	2.4	B	VII
" 21	l	T	XIX	11	103	1.2	B	VII
" 22	m	T	XIX	90	456	7.8	A,C	VII
" 23	n	T	XIX	75	449	7.3	A	VII
" 24	o	T	XIX	44	313	2.9	B	VII
" 26	p	U	XX	61	407	4.9	B	VII
" 27	q	U	XX	52	376	4.7	C	VII
" 28	r	U	XX	18	85	1.4	C	VII
" 30	s	U	XX	106	954	13.4	A	VII
Dec. 1	t	V	XXI	33	197	3.2	A	VII
" 4	u	V	XXI	54	351	5.3	A	VII
" 5	v	V	XXI	105	833	16.2	A,C	VII

2880



STATISTICS OF HYDROGRAPHY

resulting from

SURVEY OF OYSTER BARS

by

UNITED STATES COAST AND GEODETIC SURVEY

in cooperation with

MARYLAND SHELL FISH COMMISSION

in

ANNE ARUNDEL COUNTY

MARYLAND

1906-1907

NOTE: The primary object of the work covered by these statistics, was the furnishing of information for the purposes of the "Oyster Survey". Consequently, the hydrography does not necessarily fulfill all the requirements of customary hydrographic operations.

In general, the lines of soundings only cover the area of the natural oyster bars as indicated on the projections; and therefore, it will be useless to plot up a sheet for hydrographic information unless the waters in question are included in these oyster bar boundaries. (See "Explanation" on next page)

(See Descriptive Report for scheme of Projections.)

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

.....

DESCRIPTIVE REPORT

.....

TO ACCOMPANY HYDROGRAPHIC PROJECTIONS RESULTING
FROM THE SURVEY OF OYSTER BARS OF ANNE ARUNDEL
COUNTY, MARYLAND MADE BY THE MARYLAND SHELL FISH
COMMISSION IN COOPERATION WITH THE UNITED STATES
COAST AND GEODETIC SURVEY.

.....

PROJECTIONS

- A—Chesapeake Bay, North Point to Belvidere Shoals
- B—Magdaly River
- C—Chesapeake Bay, Belvidere Shoals to Sandy Point
- D—Upper Severn River
- E—Lower Severn River
- F—South River
- G—West and Rhode Rivers
- H—Chesapeake Bay, Horseshoe Point to Holland Point
- I—Chesapeake Bay, Off Mouth of South and West Rivers

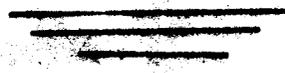
.....

UNITED STATES COAST AND GEODETIC SURVEY
C. G. Yates, Chief of Party

MARYLAND SHELL FISH COMMISSION
Swenson Esch, Hydrographic Engineer

.....
1906 — 1907

*620
11/13
Progress Map - let
of work*



EXPLANATION

Statistics and Tides
These statistics cover all hydrography executed in connection with the "Oyster Survey" in ~~Anne Arundel~~ ^{Somerset} County and adjacent waters of Maryland. All this work is contained in the sounding and tidal records ^{on file} in the Archives of the Survey, but only a part of it has been plotted on the projections forwarded on the same date. For purposes of an index to the hydrographic work, the boundary lines of oyster bars as shown on charts of oyster bars of "~~Anne Arundel~~ ^{Somerset} County and Adjacent Waters" published by the Survey, indicate very closely the area covered by soundings. Hence, it will not be necessary to plot up any of the hydrography covered by these statistics, UNLESS IT IS DESIRED TO INVESTIGATE THE WATERS INCLUDED IN THE OYSTER BOUNDARY LINES AS SHOWN ON THE PUBLISHED CHARTS OF OYSTER BARS.

The following tables are self explanatory except as to column 2 and 3.

The second column (under heading G. & G.S. Day Letter) gives the day letter as customarily used in the Survey, but the different colors, stated in parenthesis at the head of the column, indicate different series of alphabets, not different sounding boats. The third column (under heading of M.S.F. C. Book Letter) gives the book letter of the Maryland Shell Fish Commission. This was adopted by the M.S.F.C. for purposes of their own. It really has no meaning except as an additional symbol for the Vol. No. given in the 4th column. In this connection, attention is called to the fact that there are two sets of angle numbers in the sounding records. The ones in black pencil are peculiar to the book letter system described above, and occupy the ordinary position of day angle numbers. The ones in colored pencil are the day angle numbers of the G. & G.S. and they occupy the column in the sounding record headed up "Boat head by Compass".

These colored numbers correspond to such positions as were plotted on the projections, and are the ones that should be used in any future plotting that may be done on the sheets.

Attention is also called to another feature of the sounding records:- In the columns under heading of "Remarks" one of the capital letters B, S, or D, occurs opposite each sounding. These letters refer to the indications of the oyster shell character of the bottom as shown by vibration of a wire to which is attached a chain dragging over the bottom. This chain causes the wire to vibrate in proportion to the number of shells it is passing over, and the observer with his hand on wire calls out at each sounding, the character of bottom the vibrations indicate. For no vibrations the words "barren of shells" are used (B); occasional vibrations are named "scattering shells" (S); and continuous vibrations and jerks are named "dense shells" (D).

In addition to the usual contents of the tabular statistics, there has been added a column under the heading "Tide Vol. No.," which gives the "series number" of the tide record volume of Anne Arundel County used in the reduction of soundings of the corresponding date and sounding record on the same line. These volume numbers are given on the bottom of the tables of the tidal volumes and are in addition to the customary number which indicates merely the volumes of tidal observations at one particular station.

Books are not necessarily arranged according to project numbers.

The following table shows the relation between the customary station number of the Tide Record Volumes and the "series number" given in these statistics.

<u>Dates</u>	<u>Locality</u>	<u>Tide Gauge</u>	<u>Serial No.</u> (Statistics)	<u>Vol.No.</u> (archives)
July 19 to Aug. 16	Severn River	Naval Academy Whf.	I	1
Aug. 17 " " 23	" "	" " "	II	2
" 24 " Sept. 10	Entrance Severn R.	Greenbury Pt. L.H.	III	1
Sept. 10 " Oct. 10	Off Thomas Pt.	Thomas Pt. L.H.	IV	1
Oct. 11 " Nov. 3	" " "	" " " "	V	2
" 15 " Nov. 3	Chesapeake Bay	Bleedy Pt. L.H.	VI	1
Nov. 9 " Dec. 6	Entrance Patapsco R.	Seven Ft. Knoll	VII	1

Dates *Locality* *Tide Gauge*

Date 1906	C. & G.S. Day Letter	M.S.F.C. Beck Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
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" 31	j	C	III	88	799	7.5	E	I
Aug. 1	k	C	III	26	238	2.1	E	I
" 3	l	C	III	82	713	7.0	E	I
" 4	m	C	III	28	214	1.8	E	I
" 6	n	D	IV	87	876	8.4	E	I
" 15	o	D	IV	80	727	5.4	D	I
" 16	p	D-E	IV-V	86	687	6.2	D	I
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" 21	r	E	V	51	412	4.4	D	II
" 23	s	E	V	80	536	6.7	C,E	II
" 24	t	F	VI	38	245	2.9	C	III
" 28	u	F	VI	26	142	1.7	C,E	III
" 30	v	F	VI	106	715	10.1	C	III
" 31	w	F	VI	56	335	5.2	C	III
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Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
Sept. 7	a (blue)	H	VIII	109	1012	11.3	I	III
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" 17	d	I	IX	39	362	3.5	F	IV
" 18	e	I	IX	59	511	5.2	F	IV
" 19	f	I-K	IX-X	96	841	7.6	F	IV
" 20	g	K	X	96	841	6.3	F	IV
" 21	h	K-L	X-XI	138	1122	12.1	I	IV
" 22	i	L	XI	50	448	4.0	I	IV
" 24	j	L	XI	21	213	2.0	G,I	IV
" 25	k	L-M	XI-XII	88	671	5.2	F	IV
" 26	l	M	XII	77	561	5.1	G	IV
" 27	m	M	XII	31	293	3.3	I	IV
" 28	n	M	XII	77	522	4.7	G	IV
" 29	o	M-N	XII-XIII	41	426	3.7	I	IV
Oct. 2	p	N	XIII	64	432	5.1	G	IV
" 3	q	N	XIII	64	440	5.1	G	IV
" 5	r	N-O	XIII-XIV	125	1063	12.0	I	IV
" 10	s	O	XIV	20	143	1.5	F,I	IV
" 12	t	O	XIV	78	585	6.3	F	V
" 13	u	O	XIV	12	54	0.1	I	V
" 19	v	O	XIV	55	398	5.6	I	V & VI
" 23	w	O	XIV	26	194	2.4	I	V & VI
" 25	x	P	XV	155	1113	13.6	H	V & VI
" 26	y	P	XV	114	771	11.5	H	V & VI
" 29	z	Q	XVI	34	247	3.6	H	V & VI

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
Oct. 30	(green) a	Q	XVI	156	922	15.5	H	V & VI
Nov. 2	b	Q-R	XVI-XVII	141	972	12.8	H	V & VI
" 3	c	R	XVII	8	56	0.9	I	V & VI
" 9	d	R	XVII	96	568	8.2	C	VII
" 10	e	R	XVII	33	258	3.3	C	VII
" 13	f	R	XVII	20	154	1.7	C	VII
" 14	g	S	XVIII	122	793	10.3	C	VII
" 16	h	S	XVIII	42	240	2.6	B	VII
" 17	i	S	XVIII	65	400	4.4	B	VII
" 19	j	S	XVIII	44	300	3.2	B	VII
" 20	k	T	XIX	32	248	2.4	B	VII
" 21	l	T	XIX	11	103	1.2	B	VII
" 22	m	T	XIX	80	456	7.8	A,C	VII
" 23	n	T	XIX	75	449	7.3	A	VII
" 24	o	T	XIX	44	313	2.9	B	VII
" 26	p	U	XX	61	407	4.9	B	VII
" 27	q	U	XX	52	376	4.7	C	VII
" 28	r	U	XX	18	85	1.4	C	VII
" 30	s	U	XX	106	954	13.4	A	VII
Dec. 1	t	V	XXI	33	197	3.2	A	VII
" 4	u	V	XXI	54	351	5.3	A	VII
" 5	v	V	XXI	105	833	16.2	A,C	VII

STATISTICS OF HYDROGRAPHY

resulting from

SURVEY OF OYSTER BARS

by

UNITED STATES COAST AND GEODETIC SURVEY

in cooperation with

MARYLAND SHELL FISH COMMISSION

in

ANNE ARUNDEL COUNTY

MARYLAND

1906-1907

NOTE The primary object of the work covered by these statistics, was the furnishing of information for the purposes of the "Oyster Survey". Consequently, the hydrography does not necessarily fulfill all the requirements of customary hydrographic operations.

In general, the lines of soundings only cover the area of the natural oyster bars as indicated on the projections; and therefore, it will be useless to plot up a sheet for hydrographic information unless the waters in question are included in these oyster bar boundaries. (See "Explanation" on next page)

*(See Descriptive Report for scheme
of Projections.)*

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*(See Descriptive Report for scheme
of Projections.)*

EXPLANATION

These statistics cover all hydrography executed in connection with the "Oyster Survey" in Anne Arundel County and adjacent waters of Maryland. All this work is contained in the sounding and tidal records in the Archives of the Survey, but only a part of it has been plotted on the projections forwarded on the same date. For purposes of an index to the hydrographic work, the boundary lines of oyster bars as shown on charts of oysters bars of "Anne Arundel County and Adjacent Waters" published by the Survey, indicate very closely the area covered by soundings. Hence, it will not be necessary to plot up any of the hydrography covered by these statistics, UNLESS IT IS DESIRED TO INVESTIGATE THE WATERS INCLUDED IN THE OYSTER BOUNDARY LINES AS SHOWN ON THE PUBLISHED CHARTS OF OYSTER BARS.

The following tables are self explanatory except as to columns 2 and 3.

The second column (under heading C. & G. S. Day Letter) gives the day letter as customarily used in the Survey, but the different colors, stated in parenthesis at the head of the column, indicate different series of alphabets, not different sounding beats. The third column (under heading of M. S. F. C. Book Letter) gives the book letter of the Maryland Shell Fish Commission. This was adopted by the M. S. F. C. for purposes of their own. It really has no meaning except as an additional symbol for the Vol. No. given in the 4th column. In this connection, attention is called to the fact that there are two sets of angle numbers in the sounding records. The ones in black pencil are peculiar to the book letter system described above, and occupy the ordinary position of day angle numbers. The ones in colored pencil are the day angle numbers of the C. & G. S. and they occupy the column in the sounding record headed up "Boat head by Compass".

These colored numbers correspond to such positions as were plotted on the projections, and are the ones that should be used in any future plotting that may be done on the sheets.

Attention is also called to another feature of the sounding records:- In the columns under heading of "Remarks" one of the capital letters B. S. or D. occur opposite each sounding. These letters refer to the indications of the oyster shell character of the bottom as shown by vibration of a wire to which is attached a chain dragging over the bottom. This chain causes the wire to vibrate in proportion to the number of shells it is passing over, and the observer with his hand on wire calls out at each sounding, the character of bottom the vibrations indicate. For no vibrations the words "barren of shells" are used (B); occasional vibrations are named "scattering shells" (S); and continuous vibrations and jerks are named "dense shells" (D).

In addition to the usual contents of the tabular statistics, there has been added a column under the heading "Tide Vol. No.," which gives the "series number" of the tide record volume of Anne Arundel County used in the reduction of soundings of the corresponding date and sounding record on the same line. These volume numbers are given on the bottom of the tables of the tidal volumes and are in addition to the customary number which indicates merely the volumes of tidal observations at one particular station.

The following table shows the relation between the customary station number of the Tide Record Volumes and the "series number" given in these statistics.

<u>Dates</u>	<u>Locality</u>	<u>Tide Gauge</u>	<u>Serial No.</u> (Statistics)	<u>Vol.No.</u> (archives)
July 19 to Aug. 16	Severn River	Naval Academy Whf.	I	I
Aug. 17 " " 23	" "	" " "	II	2
" 24 " Sept. 10	Entrance Severn R.	Greenbury Pt. L. H.	III	1
Sept. 10 " Oct. 10	Off Thomas Pt.	Thomas Pt. L.H.	IV	1
Oct. 11 " Nov. 3	" " "	" " " "	V	2
" 15 " Nov. 3	Chesapeake Bay	Bloody Pt. L. H.	VI	1
Nov. 9 " Dec. 6	Entrance Patapsco R.	Seven Ft. Knoll	VII	1

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STATISTICS OF HYDROGRAPHY
resulting from
SURVEY OF OYSTER BARS

U. S. C. & G. SURVEY,
LIBRARY AND ARCHIVES
JUN 26 1907
Acc. No.

by
UNITED STATES COAST AND GEODETIC SURVEY
in cooperation with
MARYLAND SHELL FISH COMMISSION
in
ANNE ARUNDEL COUNTY
MARYLAND
1906-1907

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*(See Descriptive Report for scheme
for Projections.)*

EXPLANATION

These statistics cover all hydrography executed in connection with the "Oyster Survey" in Anne Arundel County and adjacent waters of Maryland. All this work is contained in the sounding and tidal records in the Archives of the Survey, but only a part of it has been plotted on the projections forwarded on the same date. For purposes of an index to the hydrographic work, the boundary lines of oyster bars as shown on charts of oyster bars of "Anne Arundel County and Adjacent Waters" published by the Survey, indicate very closely the area covered by soundings. Hence, it will not be necessary to plot up any of the hydrography covered by these statistics, UNLESS IT IS DESIRED TO INVESTIGATE THE WATERS INCLUDED IN THE OYSTER BOUNDARY LINES AS SHOWN ON THE PUBLISHED CHARTS OF OYSTER BARS.

The following tables are self explanatory except as to columns 2 and 3.

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The ones in colored pencil are the day angle numbers of the G. & G. S. and they occupy the column in the sounding record headed up "Boat head by Compass".

These colored numbers correspond to such positions as were plotted on the projections, and are the ones that should be used in any future plotting that may be done on the sheets.

Attention is also called to another feature of the sounding records:- In the column under heading of "Remarks" one of the capital letters B, S, or D, occur opposite each sounding. These letters refer to the indications of the oyster shell character of the bottom as shown by vibration of a wire to which is attached a chain dragging over the bottom. This chain causes the wire to vibrate in proportion to the number of shells it is passing over, and the observer with his hand on wire calls out at each sounding, the character of bottom the vibrations indicate. For no vibrations the words "barren of shells" are used(B); occasional vibrations are named "scattering shells" (S); and continuous vibrations and jerks are named "dense shells" (D).

In addition to the usual contents of the tabular statistics, there has been added a column under the heading "Tide Vol. No.," which gives the "series number" of the tide record volume of Anne Arundel County used in the reduction of soundings of the corresponding date and sounding record on the same line. These volume numbers are given on the bottom of the tables of the tidal volumes and are in addition to the customary number which indicated merely the volumes of tidal observations at one particular station.

The following table shows the relation between the customary station number of the Tide Record Volumes and the "series number" given in these statistics.

<u>Date</u>	<u>Locality</u>	<u>Tide Gauge</u>	<u>Serial No.</u> (Statistics)	<u>Vol. No.</u> (Archives)
July 19 to Aug. 16	Severn River	Naval Academy Whf.	I	I
Aug. 17 " " 23	" "	" " "	II	2
" 24 " Sept. 10	Entrance Severn R.	Greenbury Pt. L. H.	III	1
Sept. 10 " Oct. 10	Off Thomas Pt.	Thomas Pt. L.H.	IV	1
Oct. 11 " Nov. 3	" " "	" " " "	V	2
" 15 " Nov. 3	Chesapeake Bay	Bleedy Pt. L. H.	VI	1
Nov. 9 " Dec. 6	Entrance Patuxent R.	Seven Pt. Knoll	VII	1

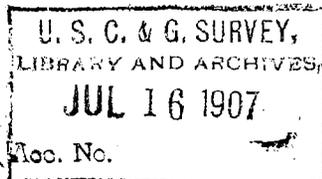
(1)

Date	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
July 19	a (Red)	A	I	58	570	6.1	E	I
" 20	b	A	I	89	897	8.1	E	I
" 21	c	A	L	43	445	3.6	E	I
" 23	d	A	I	5	25	0.3	E	I
" 25	e	A-B	I-II	57	364	4.0	E	I
" 26	f	B	II	63	630	6.2	E	I
" 27	g	B	II	65	705	4.9	E	I
" 28	h	B	II	27	256	2.4	E	I
" 30	i	B	II	38	318	3.6	E	I
" 31	j	C	III	88	799	7.5	E	I
Aug. 1	k	C	III	26	238	2.1	E	I
" 3	l	C	III	82	712	7.0	E	I
" 4	m	C	III	28	214	1.8	E	I
" 6	n	D	IV	87	876	8.4	E	I
" 15	o	D	IV	80	727	5.4	D	I
" 16	p	D-E	IV-V	86	687	6.2	D	I
" 17	q	E	V	35	280	2.6	E	II
" 21	r	E	V	51	412	4.4	D	II
" 23	s	E	V	80	536	6.7	C,E	II
" 24	t	F	VI	38	245	2.9	C	III
" 28	u	F	VI	26	142	1.7	C,E	III
" 30	v	F	VI	106	715	10.1	C	III
" 31	w	F	VI	56	335	5.2	C	III
Sept. 4	x	G	VII	71	637	7.5	F	III
" 5	y	G	VII	91	706	8.1	F	III
" 6	z	G-H	VII-VIII	104	910	9.0	F	III

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
Sept. 7	a (blue)	H	VIII	109	1012	11.3	I	III
" 10	b	H-I	VIII-IX	88	819	9.2	F	III & IV
" 13	c	I	IX	44	463	5.2	I	IV
" 17	d	I	IX	39	362	3.5	F	IV
" 18	e	I	IX	59	511	5.2	F	IV
" 19	f	I-K	IX-X	96	841	7.6	F	IV
" 20	g	K	X	96	841	6.3	F	IV
" 21	h	K-L	X-XI	138	1122	12.1	I	IV
" 22	i	L	XI	50	448	4.0	I	IV
" 24	j	L	XI	21	213	2.0	G, I	IV
" 25	k	L-M	XI-XII	88	671	5.2	F	IV
" 26	l	M	XII	77	561	5.1	G	IV
" 27	m	M	XII	31	293	3.3	I	IV
" 28	n	M	XII	77	522	4.7	G	IV
" 29	o	M-N	XII-XIII	41	426	3.7	I	IV
Oct. 2	p	N	XIII	64	432	5.1	G	IV
" 3	q	N	XIII	64	440	5.1	G	IV
" 5	r	N-O	XIII-XIV	125	1063	12.0	I	IV
" 10	s	O	XIV	20	143	1.5	F, I	IV
" 12	t	O	XIV	78	585	6.3	F	V
" 13	u	O	XIV	12	54	0.1	I	V
" 19	v	O	XIV	55	398	5.6	I	V & VI
" 23	w	O	XIV	26	194	2.4	I	V & VI
" 25	x	P	XV	155	1113	13.6	H	V & VI
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" 9	d	R	XVII	96	568	8.2	C	VII
" 10	e	R	XVII	33	258	3.3	C	VII
" 13	f	R	XVII	20	154	1.7	C	VII
" 14	g	S	XVIII	122	793	10.3	C	VII
" 16	h	S	XVIII	42	240	2.6	B	VII
" 17	i	S	XVIII	65	400	4.4	B	VII
" 19	j	S	XVIII	44	300	3.2	B	VII
" 20	k	T	XIX	32	248	2.4	B	VII
" 21	l	T	XIX	11	103	1.2	B	VII
" 22	m	T	XIX	80	456	7.8	A,C	VII
" 23	n	T	XIX	75	449	7.3	A	VII
" 24	o	T	XIX	44	313	2.9	B	VII
" 26	p	U	XX	61	407	4.9	B	VII
" 27	q	U	XX	52	376	4.7	C	VII
" 28	r	U	XX	18	65	1.4	C	VII
" 30	s	U	XX	106	954	13.4	A	VII
Dec. 1	t	V	XXI	33	197	3.2	A	VII
" 4	u	V	XXI	54	351	5.3	A	VII
" 5	v	V	XXI	105	833	16.2	A,C	VII

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STATISTICS OF HYDROGRAPHY
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(See Descriptive Report for scheme of Projections.)

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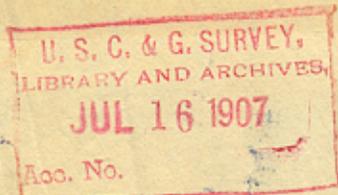
<u>Dates</u>	<u>Locality</u>	<u>Tide Gauge</u>	Serial No. (Statistics)	Vol.No. (Archives)
July 19 to Aug. 16	Severn River	Naval Academy Whf.	I	I
Aug. 17 " " 23	" "	" " "	II	2
" 24 " Sept. 10	Entrance Severn R.	Greenbury Pt. L. H.	III	1
Sept. 10 " Oct. 10	Off Thomas Pt.	Thomas Pt. L.H.	IV	1
Oct. 11 " Nov. 3	" " "	" " " "	V	2
" 15 " Nov. 3	Chesapeake Bay	Bleedy Pt. L. H.	VI	1
Nov. 9 " Dec. 6	Entrance Patapsce R.	Seven Pt. Knoll	VII	1

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	VOL- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
July 19	(red) a	A	I	58	570	6.1	E	I
" 20	b	A	I	89	897	8.1	E	I
" 21	c	A	I	43	445	3.6	E	I
" 23	d	A	I	5	25	0.3	E	I
" 25	e	A-B	I-II	57	364	4.0	E	I
" 26	f	B	II	63	630	6.2	E	I
" 27	g	B	II	65	705	4.9	E	I
" 28	h	B	II	27	256	2.4	E	I
" 30	i	B	II	38	318	3.6	E	I
" 31	j	C	III	88	799	7.5	E	I
Aug. 1	k	C	III	26	238	2.1	E	I
" 3	l	C	III	82	713	7.0	E	I
" 4	m	C	III	28	214	1.8	E	I
" 6	n	D	IV	87	876	8.4	E	I
" 15	o	D	IV	80	727	5.4	D	I
" 16	p	D-E	IV-V	86	687	6.2	D	I
" 17	q	E	V	35	280	2.6	E	II
" 21	r	E	V	51	412	4.4	D	II
" 23	s	E	V	80	536	6.7	C, E	II
" 24	t	F	VI	38	245	2.9	C	III
" 28	u	F	VI	26	142	1.7	C, E	III
" 30	v	F	VI	106	715	10.1	C	III
" 31	w	F	VI	56	335	5.2	C	III
Sept. 4	x	G	VII	71	637	7.5	F	III
" 5	y	G	VII	91	706	8.1	F	III
" 6	z	G-H	VII-VIII	104	910	9.0	F	III

Date 1906	G. & G.S. Day Letter (blue)	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Ryd. Sheet Letter	Tide Vol. No.
Sept. 7	a	H	VIII	109	1012	11.3	I	III
" 10	b	H-I	VIII-IX	86	819	9.2	F	III & IV
" 13	c	I	IX	44	463	5.2	I	IV
" 17	d	I	IX	39	362	3.5	F	IV
" 18	e	I	IX	59	511	5.2	F	IV
" 19	f	I-K	IX-X	96	841	7.6	F	IV
" 20	g	K	X	96	841	6.3	F	IV
" 21	h	K-L	X-XI	136	1122	12.1	I	IV
" 22	i	L	XI	50	448	4.0	I	IV
" 24	j	L	XI	21	215	2.0	G, I	IV
" 25	k	L-M	XI-XII	88	671	5.2	F	IV
" 26	l	M	XII	77	561	5.1	G	IV
" 27	m	M	XII	31	293	3.3	I	IV
" 28	n	M	XII	77	522	4.7	G	IV
" 29	o	M-N	XII-XIII	41	426	3.7	I	IV
Oct. 2	p	N	XIII	64	432	5.1	G	IV
" 3	q	N	XIII	64	440	5.1	G	IV
" 5	r	N-O	XIII-XIV	125	1063	12.0	I	IV
" 10	s	O	XIV	20	143	1.5	F, I	IV
" 12	t	O	XIV	78	585	6.3	F	V
" 13	u	O	XIV	12	84	0.1	I	V
" 19	v	O	XIV	55	398	5.6	I	V & VI
" 23	w	O	XIV	26	194	2.4	I	V & VI
" 25	x	P	XV	156	1113	13.6	H	V & VI
" 26	y	P	XV	114	771	11.5	H	V & VI
" 29	z	Q	XVI	34	247	3.6	H	V & VI

Date 1906	G. & G.S. Day Letter (green)	N.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
Oct. 30	a	Q	XVI	156	922	15.5	H	V & VI
Nov. 2	b	Q-R	XVI-XVII	141	972	12.8	H	V & VI
" 3	c	R	XVII	8	56	0.9	I	V & VI
" 9	d	R	XVII	96	568	6.2	C	VII
" 10	e	R	XVII	33	258	3.3	C	VII
" 13	f	R	XVII	20	154	1.7	C	VII
" 14	g	S	XVIII	122	793	10.3	C	VII
" 16	h	S	XVIII	42	240	2.6	B	VII
" 17	i	S	XVIII	65	400	4.4	B	VII
" 19	j	S	XVIII	44	309	3.2	B	VII
" 20	k	T	XIX	32	248	2.4	B	VII
" 21	l	T	XIX	11	103	1.2	B	VII
" 22	m	T	XIX	80	456	7.8	A;C	VII
" 23	n	T	XIX	75	449	7.3	A	VII
" 24	o	T	XIX	44	313	2.9	B	VII
" 26	p	U	XX	61	407	4.9	B	VII
" 27	q	U	XX	52	376	4.7	C	VII
" 28	r	U	XX	18	85	1.4	C	VII
" 30	s	U	XX	106	954	13.4	A	VII
Dec. 1	t	V	XXI	33	197	3.2	A	VII
" 4	u	V	XXI	54	351	5.3	A	VII
" 5	v	V	XXI	105	633	16.2	A;C	VII

2885



STATISTICS OF HYDROGRAPHY
resulting from
SURVEY OF OYSTER BARS
by
UNITED STATES COAST AND GEODETIC SURVEY
in cooperation with
MARYLAND SHELL FISH COMMISSION
in
ANNE ARUNDEL COUNTY
MARYLAND
1906-1907

NOTE: The primary object of the work covered by these statistics, was the furnishing of information for the purposes of the "Oyster Survey". Consequently, the hydrography does not necessarily fulfill all the requirements of customary hydrographic operations.

In general, the lines of soundings only cover the area of the natural oyster bars as indicated on the projections; and therefore, it will be useless to plot up a sheet for hydrographic information unless the waters in question are included in these oyster bar boundaries. (See "Explanation" on next page)

*(See Descriptive Report for scheme
of Projections.)*

EXPLANATION

These statistics cover all hydrography executed in connection with the "Oyster Survey" in Anne Arundel County and adjacent waters of Maryland. All this work is contained in the sounding and tidal records in the Archives of the Survey, but only a part of it has been plotted on the projections forwarded on the same date. For purposes of an index to the hydrographic work, the boundary lines of oyster bars as shown on charts of oysters bars of "Anne Arundel County and Adjacent Waters" published by the Survey, indicate very closely the area covered by soundings. Hence, it will not be necessary to plot up any of the hydrography covered by these statistics, UNLESS IT IS DESIRED TO INVESTIGATE THE WATERS INCLUDED IN THE OYSTER BOUNDARY LINES AS SHOWN ON THE PUBLISHED CHARTS OF OYSTER BARS.

The following tables are self explanatory except as to columns 2 and 3.

The second column (under heading C. & G. S. Day Letter) gives the day letter as customarily used in the Survey, but the different colors, stated in parenthesis at the head of the column, indicate different series of alphabets, not different sounding boats. The third column (under heading of M. S. F. C. Book Letter) gives the book letter of the Maryland Shell Fish Commission. This was adopted by the M. S. F. C. for purposes of their own. It really has no meaning except as an additional symbol for the Vol. No. given in the 4th column. In this connection, attention is called to the fact that there are two sets of angle numbers in the sounding records. The ones in black pencil are peculiar to the book letter system described above, and occupy the ordinary position of day angle numbers. The ones in colored pencil are the day angle numbers of the C. & G. S. and they occupy the column in the sounding record headed up "Boat head by Compass".

These colored numbers correspond to such positions as were plotted on the projections, and are the ones that should be used in any future plotting that may be done on the sheets.

Attention is also called to another feature of the sounding records:- In the columns under heading of "Remarks" one of the capital letters B, S, or D, occur opposite each sounding. These letters refer to the indications of the oyster shell character of the bottom as shown by vibration of a wire to which is attached a chain dragging over the bottom. This chain causes the wire to vibrate in proportion to the number of shells it is passing over, and the observer with his hand on wire calls out at each sounding, the character of bottom the vibrations indicate. For no vibrations the words "barren of shells" are used (B); occasional vibrations are named "scattering shells" (S); and continuous vibrations and jerks are named "dense shells" (D).

In addition to the usual contents of the tabular statistics, there has been added a column under the heading "Tide Vol. No.," which gives the "series number" of the tide record volume of Anne Arundel County used in the reduction of soundings of the corresponding date and sounding record on the same line. These volume numbers are given on the bottom of the tables of the tidal volumes and are in addition to the customary number which indicated merely the volumes of tidal observations at one particular station.

The following table shows the relation between the customary station number of the Tide Record Volumes and the "series number" given in these statistics.

<u>Dates</u>	<u>Locality</u>	<u>Tide Gauge</u>	<u>Serial No.</u> (Statistics)	<u>Vol. No.</u> (archives)
July 19 to Aug. 16	Severn River	Naval Academy Whf.	I	1
Aug. 17 " " 23	" "	" " "	II	2
" 24 " Sept. 10	Entrance Severn R.	Greenbury Pt. L.H.	III	1
Sept. 10 " Oct. 10	Off Thomas Pt.	Thomas Pt. L.H.	IV	1
Oct. 11 " Nov. 3	" " "	" " "	V	2
" 15 " Nov. 3	Chesapeake Bay	Bloody Pt. L.H.	VI	1
Nov. 9 " Dec. 6	Entrance Patapsco R.	Seven Ft. Knoll	VII	1

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	VOL- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
July 19	(red) a	A	I	58	570	6.1	E	I
" 20	b	A	I	89	897	8.1	E	I
" 21	c	A	I	43	445	3.6	E	I
" 23	d	A	I	5	25	0.3	E	I
" 25	e	A-B	I-II	57	364	4.0	E	I
" 26	f	B	II	63	630	6.2	E	I
" 27	g	B	II	65	705	4.9	E	I
" 28	h	B	II	27	256	2.4	E	I
" 30	i	B	II	38	318	3.6	E	I
" 31	j	C	III	88	799	7.5	E	I
Aug. 1	k	C	III	26	238	2.1	E	I
" 3	l	C	III	82	713	7.0	E	I
" 4	m	C	III	28	214	1.8	E	I
" 6	n	D	IV	87	876	8.4	E	I
" 15	o	D	IV	80	727	5.4	D	I
" 16	p	D-E	IV-V	86	687	6.2	D	I
" 17	q	E	V	35	280	2.6	E	II
" 21	r	E	V	51	412	4.4	D	II
" 23	s	E	V	80	536	6.7	C, E	II
" 24	t	F	VI	38	245	2.9	C	III
" 28	u	F	VI	26	142	1.7	C, E	III
" 30	v	F	VI	106	715	10.1	C	III
" 31	w	F	VI	56	335	5.2	C	III
Sept. 4	x	G	VII	71	637	7.5	F	III
" 5	y	G	VII	91	706	8.1	F	III
" 6	z	G-H	VII-VIII	104	910	9.0	F	III

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	Vol- ume No.	Posi- tions	Sound- ings	Miles Sta- tute	Hyd. Sheet Letter	Tide Vol. No.
Sept. 7	a (blue)	H	VIII	109	1012	11.3	I	III
" 10	b	H-I	VIII-IX	88	819	9.2	F	III & IV
" 13	c	I	IX	44	463	5.2	I	IV
" 17	d	I	IX	39	362	3.5	F	IV
" 18	e	I	IX	59	511	5.2	F	IV
" 19	f	I-K	IX-X	96	841	7.6	F	IV
" 20	g	K	X	96	841	6.3	F	IV
" 21	h	K-L	X-XI	138	1122	12.1	I	IV
" 22	i	L	XI	50	448	4.0	I	IV
" 24	j	L	XI	21	213	2.0	G, I	IV
" 25	k	L-M	XI-XII	88	671	5.2	F	IV
" 26	l	M	XII	77	561	5.1	G	IV
" 27	m	M	XII	31	293	3.3	I	IV
" 28	n	M	XII	77	522	4.7	G	IV
" 29	o	M-N	XII-XIII	41	426	3.7	I	IV
Oct. 2	p	N	XIII	64	432	5.1	G	IV
" 3	q	N	XIII	64	440	5.1	G	IV
" 5	r	N-O	XIII-XIV	125	1063	12.0	I	IV
" 10	s	O	XIV	20	143	1.5	F, I	IV
" 12	t	O	XIV	78	585	6.3	F	V
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" 19	v	O	XIV	55	398	5.6	I	V & VI
" 23	w	O	XIV	26	194	2.4	I	V & VI
" 25	x	P	XV	155	1113	13.6	H	V & VI
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" 30	s	U	XX	106	954	13.4	A	VII
Dec. 1	t	V	XXI	33	197	3.2	A	VII
" 4	u	V	XXI	54	351	5.3	A	VII
" 5	v	V	XXI	105	833	16.2	A,C	VII

2886

U. S. C. & G. SURVEY,
LIBRARY AND ARCHIVES,
JUL 16 1907
Acc. No.

STATISTICS OF HYDROGRAPHY

resulting from

SURVEY OF OYSTER BARS

by

UNITED STATES COAST AND GEODETIC SURVEY

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*(See Descriptive Report for scheme
of Projections.)*

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The following table shows the relation between the customary station number of the Tide Record Volumes and the "series number" given in these statistics.

<u>Dates</u>	<u>Locality</u>	<u>Tide Gauge</u>	Serial No. (Statistics)	Vol.No. (archives)
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Aug. 17 " " 23	" "	" " "	II	2
" 24 " Sept. 10	Entrance Severn R.	Greenbury Pt. L. H.	III	1
Sept. 10 " Oct. 10	Off Thomas Pt.	Thomas Pt. L.H.	IV	1
Oct. 11 " Nov. 3	" " "	" " " "	V	2
" 15 " Nov. 3	Chesapeake Bay	Bloody Pt. L. H.	VI	1
Nov. 9 " Dec. 6	Entrance Patapsco R.	Seven Ft. Knoll	VII	1

Date 1906	C. & G.S. Day Letter	M.S.F.C. Book Letter	VOL- ume No.	Posi- tions	Sound- ings	Miles Sta- ture	Hyd. Sheet Letter	Tide Vol. No.
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" 21	c	A	I	43	445	3.6	E	I
" 23	d	A	I	5	25	0.3	E	I
" 25	e	A-B	I-II	57	364	4.0	E	I
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" 21	h	K-L	X-XI	138	1122	12.1	I	IV
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" 24	j	L	XI	21	213	2.0	G, I	IV
" 25	k	L-M	XI-XII	88	671	5.2	F	IV
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" 27	m	M	XII	31	293	3.3	I	IV
" 28	n	M	XII	77	522	4.7	G	IV
" 29	o	M-N	XII-XIII	41	426	3.7	I	IV
Oct. 2	p	N	XIII	64	432	5.1	G	IV
" 3	q	N	XIII	64	440	5.1	G	IV
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" 29	z	Q	XVI	34	247	3.6	H	V & VI

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2924

See H 2878
P.T.

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