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U. S. COAST AND GEODETIC SURVEY

111 E. LESTER JONES, SUPERINTENDENT

GEODESY

TRIANGULATION ALONG THE COLUMBIA RIVER
AND THE COASTS OF OREGON AND
NORTHERN CALIFORNIA

BY

CHARLES A. MOURHESS

Computer, U. S. Coast and Geodetic Survey

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TRIANGULATION ALONG THE COLUMBIA RIVER AND THE COASTS OF OREGON AND NORTHERN CALIFORNIA.

By CHARLES A. MOURHESSE,

Computer, United States Coast and Geodetic Survey.

GENERAL STATEMENT.

This publication, together with Special Publication No. 13, "The California-Washington Arc of Primary Triangulation," gives all of the data of this Bureau for the State of Oregon. The results of this work are of great practical value to the engineer and geographer. To these it gives a large number of marked and described points, determined trigonometrically and all computed and adjusted on the same standard geodetic datum, known as the North American Datum.

The triangulation contained in this publication is of two grades of accuracy, secondary and tertiary. The secondary triangulation has an average triangle closing error of 3 seconds or less, while the tertiary or general coast triangulation has a triangle closing error of about 5 seconds.

The scheme for the trigonometric control of the coast of Oregon is, perhaps, as nearly ideal as it is possible to find anywhere in the United States. The California-Washington Arc of Primary Triangulation is the backbone of this control, and from this as a base comes the secondary work, which joins the several detached pieces of tertiary work along the coast, and upon which all the coast and river triangulation in Oregon depends.

The greater portion of this volume is taken up with the actual results of the triangulation, namely, the lists of geographic positions, the descriptions of stations, and the table of elevations. The details of the field and office work are, in general, omitted as being of insufficient importance to warrant their publication.

The index at the end of the book when used in connection with the sketches makes it possible to easily and quickly locate any or all stations for any particular locality, with their geographic positions and descriptions, and elevations when known. All of the descriptions available are given as completely as possible, and the remaining stations are nearly always sufficiently described by their names, as given on the sketches and in the table of geographic positions.

The difficulties of accurately locating and permanently defining any particular point, even with the aid of monuments and other points of reference, are often great, judging from disputes arising from this source. However, this is not true when a point is located by its geographic position, that is, by means of its longitude and latitude.

There is only one point on the earth's surface at the intersection of any one parallel of latitude and any one meridian of longitude, and therefore there can be no dispute as to the

meaning of such a geographic definition of the location of a point, even though all the original triangulation station marks used in its determination, together with the chart on which its position was originally plotted, have been totally destroyed.

In the case of the destruction of an original triangulation station mark, or any other point defined by a geographic position, a competent geodetic engineer can reestablish its exact location by means of a new system of triangulation connecting with other distant triangulation station marks which have not been destroyed. In the case of the destruction of the chart on which the position of any such point on the earth's surface was originally plotted, this point can be replotted by its geographic position with any degree of accuracy permitted by the scale of any new chart constructed for that purpose.

If there be no question at the time of the original location and legal adoption of a geographic definition of the location of a point by a given latitude and longitude, there can be no technical or legal question afterwards as to its exact meaning, or as to the exact redetermination of the location of this point, be it either on land or water at its newly determined position, or on a new chart in its newly plotted position.

Triangulation which has been done many years prior to the date of publication of its results is greatly reduced in value to the engineer and geographer by the loss of stations, due to the changes in topography, to buildings and improvements, or to the cultivation of the land. On account of the loss of surface marks or from other causes, the engineer may in many cases fail to recover a station which still exists, when by digging at the proper place the mark could be found and the station recovered. Without the guidance of the original topography or the reference marks the station can only be recovered by locating a new point in the immediate vicinity of the old one by means of triangulation carried from the nearest available triangulation stations. Knowing the positions on the same datum of both the old and new points, a distance and direction can be computed from the new point to the old, and measurements made on the ground will show the location of the old station.

In 1852 the first triangulation was begun on the Columbia River. Following this several important detached areas were covered by triangulation, the work on which has been continued intermittently until the present time. However, it was not until after the completion of the California-Washington Arc of Primary Triangulation that any of this work could be computed on the North American Datum. Even then there remained nearly all of the coast, which it was necessary to unite by means of the secondary triangulation before it could be finally placed on the standard datum.

THE SECONDARY TRIANGULATION.

In order to connect and control in a suitable manner the several separate pieces of triangulation along the coast, it was found necessary to use the secondary triangulation. This connects with the primary at two points in Oregon. From the primary line Mary-Roman it connects directly to the coast, a branch to the south connecting with the Umpqua River and the principal branch to the north connecting at frequent intervals with the coast triangulation as far as Tillamook Bay. Here it joins some of the older work which is considered to be of the same degree of accuracy. There are several figures of this old work reaching to the mouth of the Columbia River. From there north to Willapa Bay, Wash., and thence east to the primary triangulation just south of Tacoma there is a scheme of secondary work.

From the primary line White-Onion there is a continuous system of secondary triangulation south to the Klamath River, Cal. This joins frequently to the coast work and forms a strong control.

THE TERTIARY TRIANGULATION.

The tertiary triangulation contained in this publication falls naturally into three general divisions—the Columbia River, the coast of Oregon, and the coast of California—and they will be taken up briefly in that order.

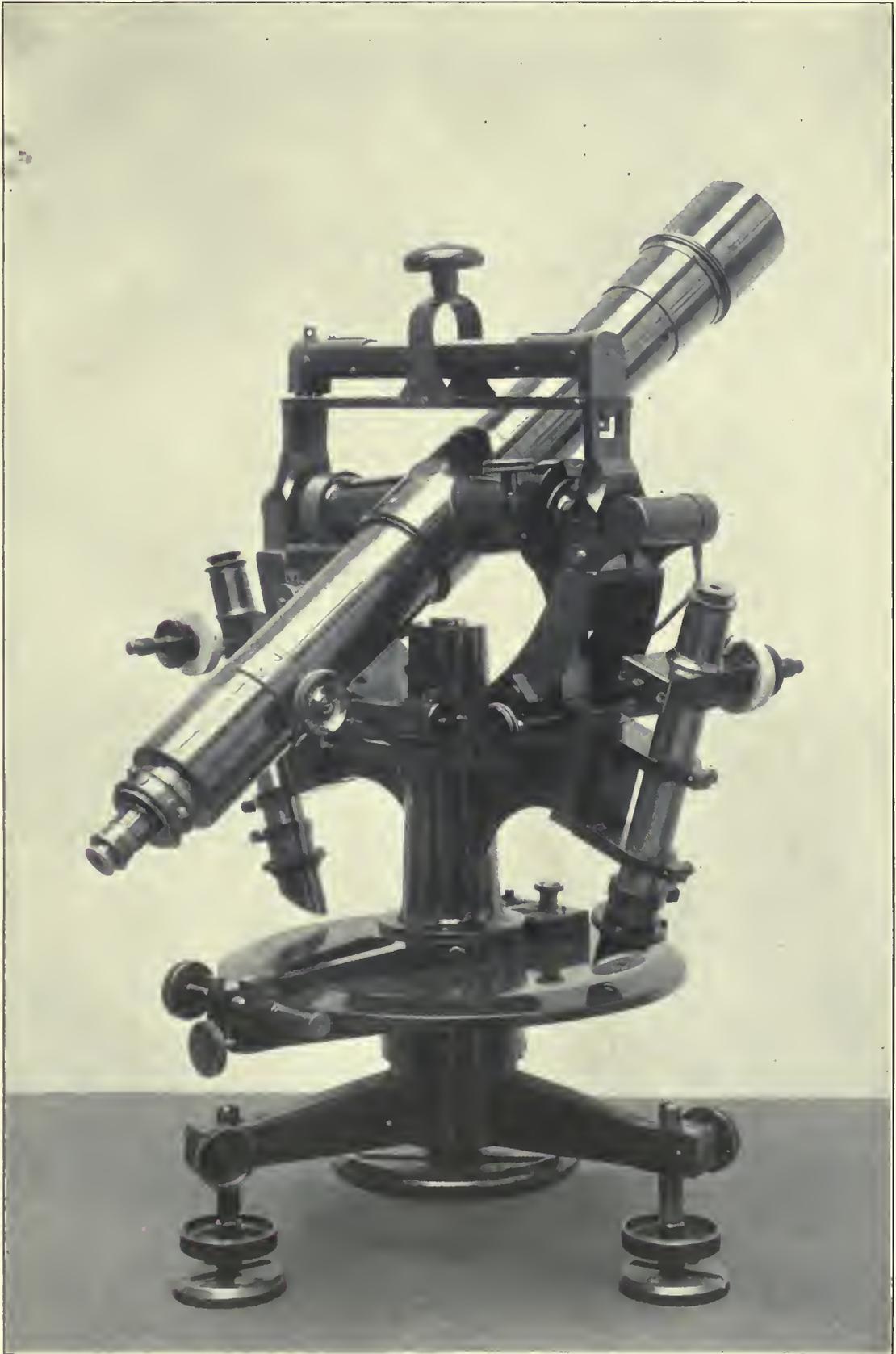


FIG. 1.—THE 8-INCH POSITION INSTRUMENT USED ON THE SECONDARY TRIANGULATION.



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The original triangulation of the Columbia River consisted of rather large figures with most of the stations on the hills some distance from the river. At present these stations can generally be recovered only with great difficulty. The more recent triangulation consists of smaller figures with the stations all close to the banks of the river. It is probable that the banks have eroded or will erode in such a manner as to destroy many of the station marks, but in such places reference marks were placed well back from the banks, and their geographic positions have been computed and follow the positions of the stations in the table of positions. The United States Army Engineers' triangulation has been computed on the standard datum by this office and is included in this publication. This work consisted originally of a single chain of triangles, but in 1913 an officer of this Survey used these stations, observed enough additional lines to give a complete check on the work, located prominent objects and aids to navigation, re-marked some of the stations, and connected the scheme at several points to the triangulation of this Survey. The United States Army Engineers' triangulation of the Columbia River is well up to the standard of similar work of the Coast and Geodetic Survey.

The triangulation along the coast of Oregon consisted originally of several detached pieces, each independent of the other, and on separate astronomic data. In some cases these were expanded until they met, but it was not until they were all connected with each other by the secondary triangulation that it was possible to place them on the North American Datum. In Coos Bay the United States Army Engineers have a system of triangulation based on the work of the Coast and Geodetic Survey. This work has been computed on the standard datum by this office, and is here published along with the other results. In some places it has become necessary to replace the old work by new triangulation, and in every such case the new work depends upon two or more of the old stations. The accuracy of this work is comparable with other coast work in the United States, usually classed as tertiary. The probable error of the length is less than 1 part in 5,000, except between side points or between intersection points near together and determined from distant stations, where the error is likely to exceed this amount.

The triangulation on the coast of California south to Trinidad Head is, on the whole, of a less accurate character than other coast triangulation in the United States. This is due mainly to the unfavorable natural conditions which would not allow well-shaped figures. In some cases the triangulation was allowed to degenerate to single triangles with only two of the angles measured. The field work was done under methods now largely superseded. The work is of sufficient accuracy for topographic purposes, but in no case should other triangulation be based on this old work. When new triangulation over this section is undertaken by this Survey it will be based directly upon the secondary triangulation, which is only a short distance inland.

ADJUSTMENT OF THE TRIANGULATION.

As has been stated, all of the positions in Oregon depend upon the California-Washington Arc of Primary Triangulation. This connects directly with the Columbia River triangulation at Portland. The positions of the stations at the mouth of the river are fixed by the secondary triangulation through Washington, not included in this publication, which is based on the primary triangle Rain-Hurst-Hal. The discrepancies produced by closing this loop were distributed along the Columbia River, as this work was considered to be very much less accurate than the secondary triangulation. The United States Army Engineer's triangulation was adjusted to fit between the stations of the old survey, with which it was connected.

The northern section of the secondary triangulation based on the primary line Mary-Roman was held fixed as computed, no discrepancies being distributed through it. The discrepancies due to the loop closure were distributed in the old work north of the Tillamook Bay and in the secondary work from the Columbia River to the primary triangle Rain-Hurst-Hal.

The southern section of the secondary work based on the line White-Onion of the primary triangulation was adjusted in several sections. As there is no loop closure with the primary there are no discrepancies due to this cause.

All tertiary work was adjusted to fit the secondary, and all discrepancies due to loop closures, measured bases, or azimuths, were eliminated.

THE NORTH AMERICAN DATUM.

Early in the year 1913 the Superintendent of the United States Coast and Geodetic Survey was notified by the director of the Comisión Geodésica Mexicana and by the chief astronomer of the Dominion of Canada Astronomical Observatory that the so-called United States Standard Datum had been adopted as the datum for the triangulation of those organizations. They also reported that the Clarke Spheroid of 1866, now used in the United States, would be used by them.

Owing to the international character of the datum now adopted by the three countries, the Superintendent of the United States Coast and Geodetic Survey has changed its designation from the "United States Standard Datum" to the "North American Datum."

EXPLANATION OF THE NORTH AMERICAN DATUM.

All of the positions and azimuths have been computed upon the Clarke Spheroid of 1866, as expressed in meters, which has been in use in the Coast and Geodetic Survey for many years.

After a spheroid has been adopted and all the angles and lengths in a triangulation have been fully fixed, it is still necessary, before the computation of latitudes, longitudes, and azimuths can be made, to adopt a standard latitude and longitude for a specified station and a standard azimuth of a line from that station. For convenience, the adopted standard position (latitude and longitude) of a given station, together with the adopted standard azimuth of a line from that station, is called the geodetic datum.

The primary triangulation in the United States was commenced at various points and existed at first as a number of detached portions in each of which the geodetic datum was necessarily dependent only upon the astronomic stations connected with that particular portion. As examples of such detached portions of triangulation there may be mentioned the early triangulation in New England and along the Atlantic coast, a detached portion of the transeontinental triangulation centering on St. Louis and another portion of the same triangulation in the Rocky Mountain region, and three separate portions of triangulation in California, in the latitude of San Francisco, in the vicinity of Santa Barbara Channel, and in the vicinity of San Diego. With the lapse of time these separate pieces expanded until they touched or overlapped.

The transeontinental triangulation, of which the office computation was completed in 1899, joined all of the detached portions mentioned and made them one continuous triangulation. As soon as this took place the logical necessity existed of discarding the old geodetic data used in these various pieces and substituting one for the whole country, or at least for as much of the country as is covered by continuous triangulation. To do this was a very heavy piece of work, and involved much preliminary study to determine the best datum to be adopted. On March 13, 1901, the Superintendent adopted what was known from that time until 1913 as the United States Standard Datum, but is now known as the North American Datum (see above), and it was decided to reduce the positions to that datum as rapidly as possible. The datum adopted was that formerly in use in New England, and therefore its adoption did not affect the positions which had been used for geographic purposes in New England and along the Atlantic coast to North Carolina, nor those in the States of New York, Pennsylvania, New Jersey, and Delaware. The adopted datum does not agree, however, with that used in The Transeontinental Triangulation and in The Eastern Oblique Arc of the United States, publications which deal primarily with the purely scientific problem of the determination of the figure of the earth and which were prepared for publication before the adoption of the new datum.

As the adoption of such a standard datum was a matter of considerable importance, it is in order here to explain the desirability of this step more fully.

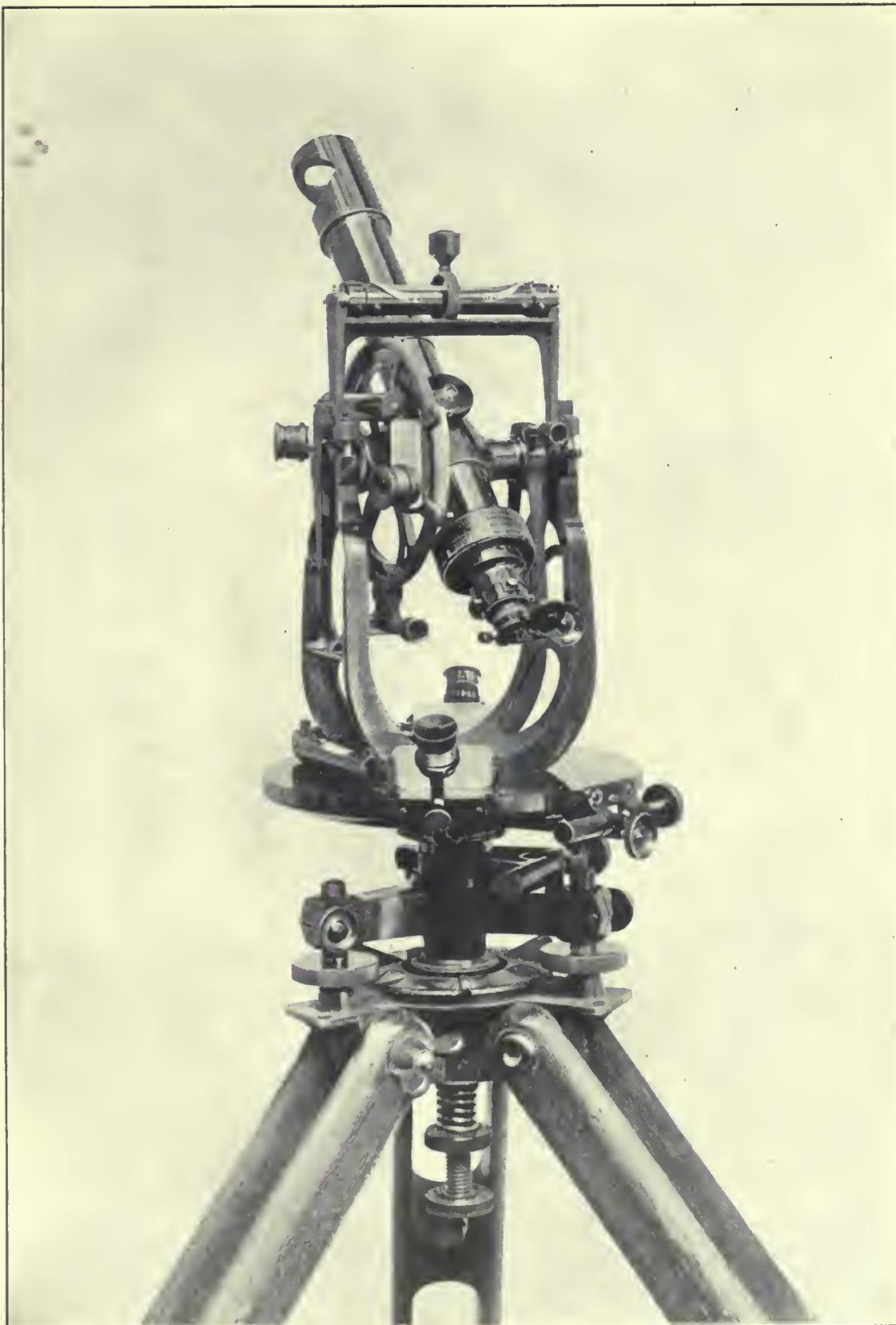


FIG. 2.—THE 7-INCH BERGER THEODOLITE NOW GENERALLY USED ON ALL TERTIARY TRIANGULATION.

The main objects to be attained by the geodetic operations of the Coast and Geodetic Survey are, first, the control of the charts published by the Survey; second, the furnishing of geographic positions (latitudes and longitudes), of accurately determined elevations, and of distances and azimuths, to officers connected with the Coast and Geodetic Survey and to other organizations; third, the determination of the figure of the earth. For the first and second objects it is not necessary that the reference spheroid should be accurately that which most closely fits the geoid within the area covered, nor that the adopted geodetic datum should be absolutely the best that can be derived from the astronomic observations at hand. It is simply desirable that the reference spheroid and the geodetic datum adopted shall be, if possible, such a close approximation to the truth that any correction which may hereafter be derived from the observations which are now or may become available shall not greatly exceed the probable errors of such corrections. It is, however, very desirable that one spheroid and one geodetic datum be used for the whole country. In fact, this is absolutely necessary if a geodetic survey is to perform fully the function of accurately coordinating all surveys within the area which it covers. This is the most important function of a geodetic survey. To perform this function, it is also highly desirable that when a certain spheroid and geodetic datum have been adopted for a country they be rigidly adhered to, without change, for all time, unless shown to be largely in error.

In striving to attain the third object, the determination of the figure of the earth, the conditions are decidedly different. This problem concerns itself primarily with astronomic observations of latitude, longitude, and azimuth, and with the geodetic positions of the points at which the astronomic observations were made, but is not concerned with the geodetic positions of other points fixed by the triangulations. The geodetic positions (latitudes and longitudes) of comparatively few points are therefore concerned in this problem. However, in marked contrast to the statements made in preceding paragraphs, it is desirable in dealing with this problem that, with each new important accession of data, a new spheroid fitting the geoid with the greatest possible accuracy, and new values of the geodetic latitudes, longitudes, and azimuths of the highest degree of accuracy should be derived.

The United States Standard (now the North American) Datum was adopted with reference to positions furnished for geographic purposes, but has no reference to the problem of the determination of the figure of the earth. It is adopted with reference to the engineer's problem of furnishing standard positions and does not affect the scientist's problem of the determination of the figure of the earth.

The principles which guided in the selection of the datum to be adopted were: First, that the adopted datum should not differ widely from the ideal datum for which the sum of the station errors in latitude, longitude, and azimuth should each be zero; second, it was desirable that the adopted datum should produce minimum changes in the publications of the Survey, including its charts; and, third, it was desirable, other things being equal, to adopt that datum which allowed the maximum number of positions already in the office registers to remain unchanged, and therefore necessitated a minimum amount of new computation. These considerations led to the adoption, as the standard, of that datum which had been in use for many years in the northeastern group of States and along the Atlantic coast as far south as North Carolina.

An examination of the station errors available in 1903 on the United States Standard Datum at 246 latitude stations, 76 longitude stations, and 152 azimuth stations, scattered widely over the United States from Maine to Louisiana and to California, indicated that this datum approaches closely the ideal with which the algebraic sum of the station errors of each class would be zero.¹

¹ This is further borne out in the reduction of 765 astronomic stations in connection with the "Supplementary investigation in 1909 of the figure of the earth and isostasy," by J. F. Hayford, published by the Coast and Geodetic Survey.

The North American Datum, upon which the positions and azimuths given in this publication depend, may be defined in terms of the position of the station Meades Ranch as follows:

$$\begin{array}{r} \circ \quad ' \quad '' \\ \phi = 39 \quad 13 \quad 26.686 \\ \lambda = 98 \quad 32 \quad 30.506 \\ \alpha \text{ to Waldo} = 75 \quad 28 \quad 14.52 \end{array}$$

Points are then said to be upon the North American Datum when they are connected with the station Meades Ranch by a continuous triangulation, through which the corresponding latitudes, longitudes, and azimuths have been computed on the Clarke spheroid of 1866, as expressed in meters, starting from the above data.

The principal lists of geographic positions published on the adopted datum throughout the whole United States are contained in the following publications of the Coast and Geodetic Survey and of other organizations:

- Appendix 8 of the Report for 1885, positions in Massachusetts and Rhode Island.
- Appendix 8 of the Report for 1888, positions in Connecticut.
- Appendix 8 of the Report for 1893, positions in Pennsylvania, Delaware, and Maryland.
- Appendix 10 of the Report for 1894, positions in Massachusetts.
- Appendix 6 of the Report for 1901, positions in Kansas and Nebraska.
- Appendix 3 of the Report for 1902, positions in Kansas, Missouri, Nebraska, and Colorado.
- Appendix 4 of the Report for 1903, positions in Kansas, Oklahoma, and Texas.
- Appendix 9 of the Report for 1904, positions in California.
- Appendix 5 of the Report for 1905, positions in Texas.
- Appendix 3 of the Report for 1907, positions in California.
- Appendix 5 of the Report for 1910, positions in California.
- Appendix 4 of the Report for 1911, positions in Nebraska, Minnesota, North Dakota, and South Dakota.
- Appendix 5 of the Report for 1911, positions in Texas.
- Appendix 6 of the Report for 1911, positions in Florida.
- Special Publication No. 11, positions in Texas, New Mexico, Arizona, and California.
- Special Publication No. 13, positions in California, Oregon, and Washington.
- Special Publication No. 16, positions in Florida.
- Special Publication No. 17, positions in Texas.
- Special Publication No. 19, position in Colorado, Utah, Nevada, Wyoming, Montana, South Dakota, and North Dakota.
- Special Publication No. 24, positions in Alabama and Mississippi.
- Special Publication No. 30, positions in West Virginia, Ohio, Kentucky, Indiana, Illinois, and Missouri.
- Special Publication No. 31, positions in Oregon, Washington, and California.
- Appendix EEE, pages 2905-3031, Annual Report of the Chief of Engineers, 1902, positions of points on and near the Great Lakes.
- Publications of the Massachusetts Harbor and Land Commission.
- Various bulletins of the United States Geological Survey.

EXPLANATION OF TABLES OF POSITIONS.

In the tables of positions the latitude and longitude of each point are given on the North American Datum (see p. 8), also the length and azimuth of each line observed over, whether in one or both ways. Along with the latitude and longitude of each point the lengths and azimuths are given of lines from that point to other points of the triangulation. No lengths or azimuths are repeated, and for a given line the length and azimuth will generally be found opposite the position of the last-mentioned of the two stations involved.

For the convenience of the draftsman a column of "seconds in meters" is given, in which is placed the length (in meters) of each small arc of a meridian or parallel corresponding to the seconds of the given latitude or longitude. To facilitate further the use of the tables, a column is given of the logarithms of the lengths. It must be remembered that it is the logarithm which is derived first from the computation, the lengths given in this table being then derived from the corresponding logarithms.

The rule followed in recent publications of this office has been to give latitudes and longitudes to thousandths of seconds for all points the positions of which are fixed by fully adjusted

triangulation. Points, the positions of which are given to hundredths of seconds only, are marked by footnotes as being without check (observed from only two stations) or checked by verticals only.

In the columns giving azimuths, distances, and logarithms of distances, the accuracy is indicated to a certain extent by the number of decimal places given, it being understood that in each case two doubtful figures are given. In some cases there is very little doubt of the correctness of the second figure from the right, while in a few cases some doubt may be cast on the third figure from the right.

These tables may be conveniently consulted by using as finders the 34 sketches and the index at the end of this publication. In the third column of the index will be found for each point a reference to the page on which its description is given, in the fourth column the page on which its elevation above sea level will be found, and in the fifth column the number of the sketch on which it appears.

The following conversion tables are inserted for the convenience of those who may wish to convert the distances or elevations given in this publication from meters to feet or from feet to meters.

Lengths—Feet to meters (from 1 to 1,000 units).

[Reduction factor: 1 foot = 0.3048006096 meter.]

Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.				
0		100	30.48006	200	60.96012	300	91.44018	400	121.92024	500	152.40030	600	182.88037	700	213.36043	800	243.84049	900	274.32055		
1	.30480	1	30.78486	1	61.56972	1	91.74498	1	122.22504	1	152.70510	1	183.18517	1	213.66523	1	244.14529	1	274.62535	1	305.10541
2	.60960	2	31.08966	2	62.17944	2	92.02996	2	123.25008	2	153.73014	2	184.21020	2	215.14026	2	246.07032	2	276.95038	2	307.83044
3	.91440	3	31.39446	3	62.78422	3	92.33548	3	123.83466	3	154.31022	3	184.79028	3	216.04034	3	247.02040	3	277.90046	3	308.78052
4	1.21920	4	31.69926	4	63.17888	4	92.64094	4	124.33944	4	154.83518	4	185.31024	4	216.54030	4	248.05036	4	278.98042	4	309.66048
5	1.52400	5	32.00406	5	63.58334	5	92.94649	5	124.44422	5	155.34022	5	185.81030	5	217.05036	5	249.08042	5	280.00048	5	310.54054
6	1.82880	6	32.30886	6	63.98780	6	93.25200	6	124.54898	6	155.84518	6	186.31032	6	217.55042	6	250.09048	6	281.02054	6	311.42060
7	2.13360	7	32.61366	7	64.39216	7	93.55756	7	124.65376	7	156.35014	7	186.81034	7	218.05046	7	251.10054	7	282.04060	7	312.34066
8	2.43840	8	32.91846	8	64.79652	8	93.86832	8	124.75854	8	156.85518	8	187.31036	8	218.55050	8	252.18060	8	283.06066	8	313.26072
9	2.74320	9	33.22326	9	65.19988	9	94.17388	9	124.86332	9	157.36022	9	187.81038	9	219.05054	9	253.26066	9	284.08072	9	314.18078
10	3.04800	10	33.52806	10	65.60424	10	94.48464	10	124.96810	10	157.86518	10	188.31040	10	219.55056	10	254.34070	10	285.10078	10	315.10084
11	3.35280	11	33.83286	11	66.00860	11	94.79540	11	125.07288	11	158.37022	11	188.81042	11	220.05060	11	255.42074	11	286.12084	11	316.02090
12	3.65760	12	34.13766	12	66.41296	12	95.10616	12	125.17766	12	158.87518	12	189.31044	12	220.55062	12	256.50080	12	287.14090	12	316.94096
13	3.96240	13	34.44246	13	66.81732	13	95.41692	13	125.28244	13	159.38022	13	189.81046	13	221.05064	13	257.58086	13	288.16096	13	317.86102
14	4.26720	14	34.74726	14	67.22168	14	95.72768	14	125.38722	14	159.88518	14	190.31048	14	221.55066	14	258.66092	14	289.18102	14	318.78108
15	4.57200	15	35.05206	15	67.62604	15	96.03844	15	125.49200	15	160.39022	15	190.81050	15	222.05068	15	259.74098	15	290.20108	15	319.70114
16	4.87680	16	35.35686	16	68.03040	16	96.34920	16	125.59678	16	160.89518	16	191.31052	16	222.55070	16	260.82104	16	291.22114	16	320.62120
17	5.18160	17	35.66166	17	68.43476	17	96.66000	17	125.70156	17	161.39022	17	191.81054	17	223.05072	17	261.90110	17	292.24120	17	321.54126
18	5.48640	18	35.96646	18	68.83912	18	96.97080	18	125.80634	18	161.89026	18	192.31056	18	223.55074	18	262.98116	18	293.26126	18	322.46132
19	5.79120	19	36.27126	19	69.24348	19	97.28160	19	125.91112	19	162.39030	19	192.81058	19	224.05076	19	264.06122	19	294.28132	19	323.38138
20	6.09600	20	36.57606	20	69.64784	20	97.59240	20	126.01590	20	162.89034	20	193.31060	20	224.55078	20	265.14128	20	295.30138	20	324.30144
21	6.40080	21	36.88086	21	70.05220	21	97.90320	21	126.12068	21	163.39038	21	193.81062	21	225.05080	21	266.22134	21	296.32144	21	325.22150
22	6.70560	22	37.18566	22	70.45656	22	98.21400	22	126.22546	22	163.89042	22	194.31064	22	225.55082	22	267.30140	22	297.34150	22	326.14156
23	7.01040	23	37.49046	23	70.86092	23	98.52480	23	126.33024	23	164.39046	23	194.81066	23	226.05084	23	268.38146	23	298.36156	23	327.06162
24	7.31520	24	37.79526	24	71.26528	24	98.83560	24	126.43502	24	164.89050	24	195.31068	24	226.55086	24	269.46152	24	299.38162	24	327.98168
25	7.62000	25	38.10006	25	71.66964	25	99.14640	25	126.53980	25	165.39054	25	195.81070	25	227.05088	25	270.54158	25	300.40168	25	328.90174
26	7.92480	26	38.40486	26	72.07400	26	99.45720	26	126.64458	26	165.89058	26	196.31072	26	227.55090	26	271.62164	26	301.42174	26	329.82180
27	8.22960	27	38.70966	27	72.47836	27	99.76800	27	126.74936	27	166.39062	27	196.81074	27	228.05092	27	272.70170	27	302.44180	27	330.74186
28	8.53440	28	39.01446	28	72.88272	28	99.97880	28	126.85414	28	166.89066	28	197.31076	28	228.55094	28	273.78176	28	303.46186	28	331.66192
29	8.83920	29	39.31926	29	73.28708	29	100.28960	29	126.95892	29	167.39070	29	197.81078	29	229.05096	29	274.86182	29	304.48192	29	332.58198
30	9.14400	30	39.62406	30	73.69144	30	100.60040	30	127.06370	30	167.89074	30	198.31080	30	229.55098	30	275.94188	30	305.50198	30	333.50204
31	9.44880	31	39.92886	31	74.09580	31	100.91120	31	127.16848	31	168.39078	31	198.81082	31	230.05100	31	277.02194	31	306.52204	31	334.42210
32	9.75360	32	40.23366	32	74.50016	32	101.22200	32	127.27326	32	168.89082	32	199.31084	32	230.55102	32	278.10200	32	307.54210	32	335.34216
33	10.05840	33	40.53846	33	74.90452	33	101.53280	33	127.37804	33	169.39086	33	199.81086	33	231.05104	33	279.18206	33	308.56216	33	336.26222
34	10.36320	34	40.84326	34	75.30888	34	101.84360	34	127.48282	34	169.89090	34	200.31088	34	231.55106	34	280.26212	34	309.58222	34	337.18228
35	10.66800	35	41.14806	35	75.71324	35	102.15440	35	127.58760	35	170.39094	35	200.81090	35	232.05108	35	281.34218	35	310.60228	35	338.10234
36	10.97280	36	41.45286	36	76.11760	36	102.46520	36	127.69238	36	170.89098	36	201.31092	36	232.55110	36	282.42224	36	311.62234	36	339.02240
37	11.27760	37	41.75766	37	76.52196	37	102.77600	37	127.79716	37	171.39102	37	201.81094	37	233.05112	37	283.50230	37	312.64240	37	340.04246
38	11.58240	38	42.06246	38	76.92632	38	103.08680	38	127.90194	38	171.89106	38	202.31096	38	233.55114	38	284.58236	38	313.66246	38	340.96252
39	11.88720	39	42.36726	39	77.33068	39	103.39760	39	128.00672	39	172.39110	39	202.81098	39	234.05116	39	285.66242	39	314.68252	39	341.88258
40	12.19200	40	42.67206	40	77.73504	40	103.70840	40	128.11150	40	172.89114	40	203.31100	40	234.55118	40	286.74248	40	315.70258	40	342.80264
41	12.49680	41	42.97686	41	78.13940	41	104.01920	41	128.21628	41	173.39118	41	203.81102	41	235.05120	41	287.82254	41	316.72264	41	343.72270
42	12.80160	42	43.28166	42	78.54376	42	104.33000	42	128.32106	42	173.89122	42	204.31104	42	235.55122	42	288.90260	42	317.74270	42	344.64276
43	13.10640	43	43.58646	43	78.94812	43	104.64080	43	128.42584	43	174.39126	43	204.81106	43	236.05124	43	289.98266	43	318.76276	43	345.56282
44	13.41120	44	43.89126	44	79.35248	44	104.95160	44	128.53062	44	174.89130	44	205.31108	44	236.55126	44	291.06272	44	319.78282	44	346.48288
45	13.71600	45	44.19606	45	79.75684	45	105.26240	45	128.63540	45	175.39134	45	205.81110	45	237.05128	45	292.14278	45	320.80288	45	347.40294
46	14.02080	46	44.50086	46	80.16120	46	105.57320	46	128.74018	46	175.89138	46	206.31112	46	237.55130	46	293.22284	46	321.82294	46	348.32300
47	14.32560	47	44.80566	47	80.56556	47	105.884														

50	15. 24005	150	45. 73008	350	106. 68021	450	137. 10027	550	167. 64034	650	198. 12040	750	228. 60046	850	259. 08052	950	289. 56058
1	15. 54483	1	46. 02480	1	106. 98501	1	137. 46307	1	167. 94514	1	198. 42520	1	228. 90526	1	259. 38532	1	289. 86538
2	15. 84965	2	46. 32969	2	107. 28981	2	137. 76988	2	168. 24094	2	199. 73000	2	229. 21006	2	259. 69012	2	290. 17018
3	16. 15445	3	46. 63449	3	107. 59402	3	138. 07468	3	168. 55474	3	199. 03480	3	229. 51485	3	259. 99492	3	290. 47498
4	16. 45923	4	46. 93929	4	107. 89942	4	138. 37948	4	168. 85964	4	199. 33960	4	229. 81966	4	260. 29972	4	290. 77978
5	17. 76405	5	47. 24409	5	108. 20422	5	138. 68428	5	169. 16434	5	199. 64440	5	230. 24446	5	260. 60452	5	291. 08458
6	17. 06883	6	47. 54890	6	108. 50902	6	138. 98908	6	169. 46914	6	199. 94920	6	230. 49926	6	260. 90932	6	291. 38938
7	17. 37363	7	47. 85371	7	108. 81382	7	139. 29388	7	169. 77394	7	200. 25400	7	230. 73406	7	261. 21412	7	291. 69418
8	17. 67844	8	48. 15850	8	109. 11862	8	139. 59868	8	170. 07874	8	200. 55880	8	231. 03886	8	261. 51892	8	291. 99898
9	17. 98324	9	48. 46330	9	109. 42342	9	139. 90348	9	170. 38354	9	200. 86360	9	231. 34366	9	261. 82372	9	292. 30378
60	18. 28804	260	79. 24816	360	109. 72822	460	140. 20828	560	170. 68384	660	201. 16840	760	231. 64846	860	262. 12552	960	292. 60859
1	18. 59284	1	79. 55296	1	110. 03302	1	140. 51308	1	171. 09314	1	201. 47320	1	231. 95326	1	262. 43322	1	292. 91339
2	18. 89764	2	79. 85776	2	110. 33782	2	140. 81788	2	171. 39798	2	201. 77800	2	232. 25806	2	262. 73813	2	293. 21819
3	19. 20244	3	80. 16258	3	110. 64262	3	141. 12266	3	171. 70274	3	202. 08280	3	232. 56287	3	263. 04293	3	293. 52299
4	19. 50724	4	80. 46738	4	110. 94742	4	141. 42748	4	171. 99754	4	202. 38760	4	232. 86767	4	263. 34773	4	293. 82779
5	19. 81204	5	80. 77216	5	111. 25222	5	141. 73228	5	172. 21224	5	202. 69241	5	233. 17247	5	263. 65253	5	294. 13259
6	20. 11684	6	81. 07696	6	111. 55702	6	142. 03708	6	172. 51714	6	202. 99721	6	233. 47727	6	263. 95733	6	294. 43739
7	20. 42164	7	81. 38176	7	111. 86182	7	142. 34188	7	172. 82196	7	203. 30201	7	233. 78207	7	264. 26213	7	294. 74219
8	20. 72644	8	81. 68656	8	112. 16662	8	142. 64660	8	173. 12676	8	203. 60681	8	234. 08687	8	264. 56693	8	295. 04699
9	21. 03124	9	81. 99136	9	112. 47142	9	142. 95140	9	173. 43156	9	203. 91161	9	234. 39167	9	264. 87173	9	295. 35179
70	21. 33604	270	82. 29616	370	112. 77622	470	143. 25628	570	173. 73636	670	204. 21641	770	234. 69647	870	265. 17653	970	295. 65669
1	21. 64084	1	82. 60097	1	113. 08102	1	143. 56109	1	174. 04116	1	204. 52121	1	235. 00127	1	265. 48133	1	295. 96139
2	21. 94564	2	82. 90577	2	113. 38582	2	143. 86589	2	174. 34596	2	204. 82601	2	235. 30607	2	265. 78613	2	296. 26619
3	22. 25044	3	83. 21057	3	113. 69062	3	144. 17069	3	174. 65076	3	205. 13081	3	235. 61087	3	266. 09093	3	296. 57099
4	22. 55524	4	83. 51537	4	113. 99543	4	144. 47549	4	174. 95556	4	205. 43561	4	235. 91567	4	266. 39573	4	296. 87579
5	22. 86005	5	83. 82017	5	114. 30023	5	144. 78029	5	175. 26036	5	205. 74041	5	236. 22047	5	266. 70053	5	297. 18059
6	23. 16485	6	84. 12497	6	114. 60503	6	145. 08509	6	175. 56516	6	206. 04521	6	236. 52527	6	267. 00533	6	297. 48539
7	23. 46965	7	84. 42977	7	114. 90983	7	145. 38989	7	175. 86996	7	206. 35001	7	236. 83007	7	267. 31013	7	297. 79020
8	23. 77445	8	84. 73457	8	115. 21463	8	145. 69469	8	176. 17476	8	206. 65481	8	237. 13487	8	267. 61494	8	298. 09500
9	24. 07925	9	85. 03937	9	115. 51943	9	145. 99949	9	176. 47956	9	206. 95961	9	237. 43967	9	267. 91974	9	298. 39980
80	24. 38405	280	85. 34417	380	115. 82423	480	146. 30429	580	176. 78436	680	207. 26441	780	237. 74448	880	268. 22454	980	298. 70460
1	24. 68885	1	85. 64897	1	116. 12903	1	146. 60909	1	177. 08916	1	207. 56922	1	238. 04928	1	268. 52934	1	299. 00940
2	24. 99365	2	85. 95377	2	116. 43383	2	146. 91389	2	177. 39396	2	207. 87402	2	238. 35408	2	268. 83414	2	299. 31420
3	25. 29845	3	86. 25857	3	116. 73863	3	147. 21869	3	177. 69876	3	208. 17882	3	238. 65888	3	269. 13894	3	299. 61900
4	25. 60325	4	86. 56337	4	117. 04343	4	147. 52350	4	178. 00356	4	208. 48362	4	238. 96368	4	269. 44374	4	299. 92380
5	25. 90805	5	86. 86817	5	117. 34823	5	147. 82830	5	178. 30836	5	208. 78842	5	239. 26848	5	269. 74854	5	300. 22860
6	26. 21285	6	87. 17297	6	117. 65303	6	148. 13310	6	178. 61316	6	209. 09322	6	239. 57328	6	270. 05334	6	300. 53340
7	26. 51765	7	87. 47777	7	117. 95783	7	148. 43790	7	178. 91796	7	209. 39802	7	239. 87808	7	270. 35814	7	300. 83820
8	26. 82245	8	87. 78257	8	118. 26263	8	148. 74270	8	179. 22276	8	209. 70282	8	240. 18288	8	270. 66294	8	301. 14300
9	27. 12725	9	88. 08733	9	118. 56743	9	149. 04750	9	179. 52756	9	210. 00762	9	240. 48768	9	270. 96774	9	301. 44780
90	27. 43205	290	88. 39218	390	118. 87224	490	149. 35230	590	179. 83236	690	210. 31244	790	240. 79248	890	271. 27254	990	301. 75260
1	27. 73685	1	88. 69698	1	119. 17704	1	149. 65710	1	180. 13716	1	210. 61722	1	241. 09728	1	271. 57734	1	302. 05740
2	28. 04165	2	89. 00178	2	119. 48184	2	149. 96190	2	180. 44196	2	210. 92202	2	241. 39704	2	271. 88214	2	302. 36220
3	28. 34645	3	89. 30658	3	119. 78664	3	150. 26670	3	180. 74672	3	211. 22682	3	241. 70180	3	272. 18694	3	302. 66700
4	28. 65125	4	89. 61138	4	120. 09144	4	150. 57150	4	181. 05156	4	211. 53162	4	242. 01156	4	272. 49174	4	302. 97180
5	28. 95605	5	89. 91618	5	120. 39624	5	150. 87630	5	181. 35636	5	211. 83642	5	242. 31648	5	272. 79654	5	303. 27660
6	29. 26085	6	90. 22098	6	120. 70104	6	151. 18110	6	181. 66116	6	212. 14122	6	242. 62140	6	273. 10136	6	303. 58140
7	29. 56565	7	90. 52578	7	121. 00584	7	151. 48590	7	181. 96596	7	212. 44602	7	242. 92630	7	273. 40616	7	303. 88620
8	29. 87045	8	90. 83058	8	121. 31064	8	151. 79070	8	182. 27076	8	212. 75082	8	243. 23120	8	273. 71092	8	304. 19100
9	30. 17525	9	91. 13538	9	121. 61544	9	152. 09550	9	182. 57557	9	213. 05562	9	243. 53606	9	274. 01676	9	304. 49580

10 inches = .25400 meter.
 11 inches = .27940 meter.
 12 inches = .30480 meter.
 7 inches = .17800 meter.
 8 inches = .20320 meter.
 9 inches = .22860 meter.
 4 inches = .10160 meter.
 5 inches = .12700 meter.
 6 inches = .15240 meter.
 1 inch = .02540 meter.
 2 inches = .05080 meter.
 3 inches = .07620 meter.

Lengths—Meters to feet (from 1 to 1,000 units).

[Reduction factor: 1 meter = 3.280833333 feet.]

Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.	Meters.	Feet.								
0		100	328.08333	200	656.16667	300	984.25000	400	1,312.33333	500	1,640.41667	600	1,968.50000								
1	3.28083	1	331.36417	1	659.44750	1	987.53083	1	1,315.61417	1	1,643.69750	1	1,971.78083								
2	6.56167	2	662.72833	2	990.81167	2	1,318.86917	2	1,646.97833	2	1,975.04167	2	2,363.25833								
3	9.84250	3	993.09250	3	1,322.18333	3	1,650.23117	3	1,978.34250	3	2,366.42583	3	2,694.50917								
4	13.12333	4	1,324.45667	4	1,681.54667	4	1,981.59833	4	2,371.62333	4	2,697.77000	4	3,025.76583								
5	16.40417	5	1,653.82083	5	1,992.91083	5	2,312.90583	5	2,641.90417	5	2,989.03167	5	3,357.02167								
6	19.68500	6	1,985.27500	6	2,324.27500	6	2,653.26917	6	2,973.26583	6	3,310.28667	6	3,688.27750								
7	22.96583	7	2,316.63917	7	2,654.63917	7	2,984.63917	7	3,304.53167	7	3,641.54167	7	3,979.54167								
8	26.24667	8	2,648.00333	8	2,996.00333	8	3,315.99667	8	3,646.78667	8	3,982.79667	8	4,313.00000								
9	29.52750	9	2,979.36750	9	3,327.36750	9	3,648.36750	9	3,988.05250	9	4,315.26250	9	4,644.25833								
10	32.80833	110	360.89167	210	688.97500	310	1,017.05833	410	1,345.14167	510	1,673.22500	610	2,001.30833	710	2,329.39167	810	2,657.47500	910	2,985.55833		
11	36.08917	1	364.17250	1	692.25833	1	1,020.39167	1	1,348.42250	1	1,676.50833	1	2,004.57083	1	2,332.57500	1	2,660.75833	1	2,998.83917	1	3,319.12500
12	39.37000	2	367.45333	2	695.53917	2	1,023.62000	2	1,351.70333	2	1,679.76917	2	2,007.84167	2	2,335.84167	2	2,664.02917	2	2,999.10000	2	3,322.40000
13	42.65083	3	370.73417	3	698.81750	3	1,026.84833	3	1,363.01417	3	1,689.07833	3	2,011.10833	3	2,339.10417	3	2,667.29167	3	2,999.36083	3	3,325.66083
14	45.93167	4	374.01500	4	702.09833	4	1,030.18167	4	1,374.32500	4	1,698.34583	4	2,014.43167	4	2,342.35500	4	2,670.58833	4	2,999.62167	4	3,328.92167
15	49.21250	5	377.29583	5	705.37917	5	1,033.42500	5	1,385.63583	5	1,707.66083	5	2,017.71250	5	2,345.62083	5	2,673.87917	5	2,999.88250	5	3,001.98250
16	52.49333	6	380.57667	6	708.66000	6	1,036.66083	6	1,396.94667	6	1,716.97167	6	2,021.00000	6	2,348.89167	6	2,675.39167	6	2,999.14333	6	3,004.24333
17	55.77417	7	383.85750	7	711.94083	7	1,039.89167	7	1,408.25750	7	1,728.28250	7	2,024.27417	7	2,352.04167	7	2,676.90000	7	2,999.40417	7	3,006.50417
18	59.05500	8	387.13833	8	715.22167	8	1,043.12500	8	1,419.56833	8	1,739.59333	8	2,027.54583	8	2,355.29167	8	2,677.90833	8	2,999.66500	8	3,008.76500
19	62.33583	9	390.41917	9	718.50250	9	1,046.35833	9	1,430.87917	9	1,750.90417	9	2,030.81667	9	2,358.54167	9	2,678.91667	9	2,999.92583	9	3,011.02583
20	65.61667	120	393.70000	220	721.78833	320	1,049.80667	420	1,371.95000	520	1,706.03333	620	2,034.11667	720	2,362.20000	820	2,680.28333	920	2,999.56667		
1	68.89750	1	396.98083	1	725.06917	1	1,053.14167	1	1,383.23083	1	1,716.34583	1	2,037.39167	1	2,365.45833	1	2,681.29167	1	2,999.82750	1	3,013.28750
2	72.17833	2	400.26167	2	728.35000	2	1,056.37500	2	1,394.54167	2	1,727.65667	2	2,040.67833	2	2,368.71167	2	2,682.30000	2	2,999.08833	2	3,015.54833
3	75.45917	3	403.54250	3	731.63083	3	1,059.60833	3	1,405.84167	3	1,738.96833	3	2,043.95917	3	2,372.02500	3	2,683.30833	3	2,999.34917	3	3,017.80917
4	78.74000	4	406.82333	4	734.91167	4	1,062.84000	4	1,417.14167	4	1,750.27917	4	2,047.24000	4	2,375.28333	4	2,684.31667	4	2,999.60917	4	3,020.07000
5	82.02083	5	410.10417	5	738.19250	5	1,066.07083	5	1,428.43583	5	1,761.58833	5	2,050.52083	5	2,378.54167	5	2,685.32500	5	2,999.86917	5	3,022.33083
6	85.30167	6	413.38500	6	741.47333	6	1,069.30167	6	1,439.73167	6	1,772.89833	6	2,053.80167	6	2,381.79583	6	2,686.33333	6	2,999.12917	6	3,024.59167
7	88.58250	7	416.66583	7	744.75417	7	1,072.52500	7	1,450.92833	7	1,784.20917	7	2,057.08250	7	2,385.04167	7	2,687.34167	7	2,999.38917	7	3,026.85167
8	91.86333	8	419.94667	8	748.03500	8	1,075.75833	8	1,462.12083	8	1,795.61833	8	2,060.36333	8	2,388.29167	8	2,688.35000	8	2,999.64917	8	3,029.11167
9	95.14417	9	423.22750	9	751.31667	9	1,078.99167	9	1,473.31667	9	1,806.92833	9	2,063.64417	9	2,391.54583	9	2,689.35833	9	2,999.90917	9	3,031.37250
30	98.42500	130	426.50833	230	754.59167	330	1,082.42500	430	1,410.75833	530	1,738.54167	630	2,066.92500	730	2,395.08833	830	2,690.39167	930	2,999.64833		
1	101.70583	1	429.78917	1	757.87250	1	1,085.65833	1	1,421.95000	1	1,749.85000	1	2,070.20833	1	2,398.28917	1	2,691.40000	1	2,999.90833	1	3,033.63083
2	104.98667	2	433.07000	2	761.15333	2	1,088.89167	2	1,433.14167	2	1,761.14167	2	2,073.48667	2	2,401.47000	2	2,692.40833	2	2,999.16833	2	3,035.89167
3	108.26750	3	436.35083	3	764.43417	3	1,092.12500	3	1,444.33333	3	1,772.33333	3	2,076.76750	3	2,404.75083	3	2,693.41667	3	2,999.42833	3	3,038.15167
4	111.54833	4	439.63167	4	767.71500	4	1,095.35833	4	1,455.52500	4	1,783.52500	4	2,080.04833	4	2,408.13167	4	2,694.42500	4	2,999.68833	4	3,040.41167
5	114.82917	5	442.91250	5	770.99583	5	1,098.59167	5	1,466.71667	5	1,794.71667	5	2,083.32917	5	2,411.41250	5	2,695.43333	5	2,999.94833	5	3,042.67250
6	118.11000	6	446.19333	6	774.27667	6	1,101.82500	6	1,477.90833	6	1,805.90833	6	2,086.61000	6	2,414.69333	6	2,696.44167	6	2,999.20833	6	3,044.93333
7	121.39083	7	449.47417	7	777.55750	7	1,105.05833	7	1,489.10000	7	1,817.10000	7	2,089.89083	7	2,417.97417	7	2,697.45000	7	2,999.46833	7	3,047.19417
8	124.67167	8	452.75500	8	780.83833	8	1,108.29167	8	1,500.29167	8	1,828.29167	8	2,093.17167	8	2,421.25500	8	2,698.45833	8	2,999.72833	8	3,049.45417
9	127.95250	9	456.03583	9	784.11917	9	1,111.52500	9	1,511.48333	9	1,839.48333	9	2,096.45250	9	2,424.53833	9	2,699.46667	9	2,999.98833	9	3,051.71500
40	131.23333	140	459.31667	240	787.40000	340	1,115.76417	440	1,443.56667	540	1,771.65000	640	2,099.73333	740	2,427.81667	840	2,699.70000	940	2,999.96000		
1	134.51417	1	462.59750	1	790.68083	1	1,119.00000	1	1,454.75833	1	1,782.84167	1	2,103.01417	1	2,431.09667	1	2,700.70000	1	2,999.96000	1	3,054.00000
2	137.79500	2	465.87833	2	793.96167	2	1,122.24500	2	1,465.95000	2	1,794.03333	2	2,106.29500	2	2,434.37833	2	2,701.70833	2	2,999.22000	2	3,056.26083
3	141.07583	3	469.15917	3	797.24250	3	1,125.48083	3	1,477.14167	3	1,805.11667	3	2,109.57833	3	2,437.65917	3	2,702.71667	3	2,999.48000	3	3,058.52167
4	144.35667	4	472.44000	4	800.52333	4	1,128.72083	4	1,488.24167	4	1,816.20000	4	2,112.86667	4	2,440.94000	4	2,703.72500	4	2,999.74000	4	3,060.78250
5	147.63750	5	475.72083	5	803.80417	5	1,131.95833	5	1,499.33667	5	1,827.28667	5	2,116.13750	5	2,444.22083	5	2,704.73333	5	2,999.00000	5	3,063.04333
6	150.91833	6	479.00167	6	807.08500	6	1,135.19167	6	1,510.43333	6	1,838.37500	6	2,119.41833	6	2,447.50167	6	2,705.74167	6	2,999.26000	6	3,065.30417
7	154.19917	7	482.28250	7	810.36583	7	1,138.42500	7	1,521.52500	7	1,847.46667	7	2,122.69917	7	2,450.78333	7	2,706.75000	7	2,999.52000	7	3,067.56417
8	157.48000	8	485.56333	8	813.64667	8	1,141.65833	8	1,532.61667	8	1,856.55833	8	2,125.98000	8	2,454.06667	8	2,707.75833	8	2,999.78000	8	3,069.82583

50	164, 04167	150	492, 12500	350	1,148, 29167	450	1,476, 37600	550	1,804, 86250	650	2,182, 54167	750	2,460, 62500	850	2,788, 70833	950	3,116, 79167
1	167, 32250	1	495, 40683	1	1,161, 57250	1	1,479, 68683	1	1,807, 73917	1	2,185, 82250	1	2,463, 90683	1	2,791, 98917	1	3,120, 07250
2	170, 60333	2	498, 68667	2	1,158, 80333	2	1,482, 99667	2	1,814, 90083	2	2,182, 03333	2	2,467, 97000	2	2,795, 27000	2	3,123, 35333
3	173, 88417	3	501, 96750	3	1,154, 13417	3	1,486, 21750	3	1,811, 30083	3	2,184, 38417	3	2,470, 46750	3	2,798, 55083	3	3,126, 63417
4	177, 16500	4	505, 24833	4	1,161, 41500	4	1,489, 49833	4	1,817, 58167	4	2,185, 66500	4	2,473, 74833	4	2,801, 83167	4	3,129, 91500
5	180, 44583	5	508, 52917	5	1,164, 69583	5	1,492, 77917	5	1,820, 86250	5	2,186, 94583	5	2,476, 10250	5	2,804, 11250	5	3,133, 19683
6	183, 72667	6	511, 81000	6	1,167, 97667	6	1,495, 06000	6	1,823, 14333	6	2,188, 22667	6	2,479, 31000	6	2,807, 39333	6	3,136, 47667
7	187, 00750	7	515, 90983	7	1,171, 25750	7	1,499, 34817	7	1,827, 42417	7	2,189, 50750	7	2,482, 59333	7	2,810, 67500	7	3,139, 75750
8	190, 28833	8	519, 37167	8	1,174, 63833	8	1,502, 62167	8	1,830, 70500	8	2,190, 78833	8	2,485, 87667	8	2,813, 95000	8	3,143, 03833
9	193, 56917	9	521, 65250	9	1,177, 61917	9	1,505, 90250	9	1,833, 98583	9	2,192, 06917	9	2,489, 16250	9	2,816, 23583	9	3,146, 31917
60	196, 85000	100	594, 93833	300	1,181, 10000	400	1,509, 18333	500	1,837, 26667	600	2,185, 35000	700	2,483, 43333	800	2,821, 51667	900	3,149, 80000
1	200, 13083	1	598, 21417	1	1,184, 38083	1	1,512, 46417	1	1,840, 54750	1	2,186, 63000	1	2,486, 71417	1	2,824, 79750	1	3,152, 88083
2	203, 41167	2	601, 49500	2	1,187, 66167	2	1,515, 74500	2	1,843, 82750	2	2,187, 91167	2	2,490, 99500	2	2,827, 07833	2	3,156, 16167
3	206, 69250	3	604, 77583	3	1,190, 94250	3	1,519, 02833	3	1,847, 10917	3	2,189, 19250	3	2,493, 27667	3	2,831, 35917	3	3,159, 44250
4	209, 97333	4	608, 10500	4	1,194, 22333	4	1,522, 30667	4	1,850, 39000	4	2,191, 47333	4	2,496, 55833	4	2,834, 64000	4	3,162, 72333
5	213, 25417	5	611, 38750	5	1,197, 50417	5	1,525, 58750	5	1,853, 67083	5	2,192, 75417	5	2,499, 83750	5	2,837, 92083	5	3,166, 00417
6	216, 53500	6	614, 66833	6	1,200, 78500	6	1,528, 86833	6	1,856, 95167	6	2,194, 03500	6	2,502, 11750	6	2,840, 20167	6	3,169, 28500
7	219, 81583	7	617, 94917	7	1,204, 06583	7	1,532, 14917	7	1,860, 23250	7	2,195, 31683	7	2,505, 39833	7	2,843, 48250	7	3,172, 56583
8	223, 09667	8	621, 18000	8	1,207, 34667	8	1,535, 43000	8	1,863, 51333	8	2,196, 59833	8	2,508, 67917	8	2,846, 76333	8	3,175, 84667
9	226, 37750	9	624, 46083	9	1,210, 62750	9	1,538, 71083	9	1,866, 79417	9	2,197, 87917	9	2,511, 96000	9	2,849, 04417	9	3,179, 12750
70	229, 65833	170	557, 74167	370	1,213, 90833	470	1,541, 99167	570	1,870, 07500	670	2,188, 16833	770	2,526, 24167	870	2,854, 32500	970	3,182, 40833
1	232, 93917	1	661, 02250	1	1,217, 18917	1	1,545, 27250	1	1,873, 35683	1	2,201, 43917	1	2,529, 52500	1	2,857, 60683	1	3,185, 68917
2	236, 22000	2	664, 30333	2	1,220, 47000	2	1,548, 55333	2	1,876, 63667	2	2,204, 72000	2	2,532, 80667	2	2,860, 88667	2	3,188, 97000
3	239, 50083	3	667, 58417	3	1,223, 75083	3	1,551, 83417	3	1,879, 91750	3	2,208, 00683	3	2,536, 10833	3	2,864, 16750	3	3,192, 25083
4	242, 78167	4	670, 86500	4	1,227, 03167	4	1,555, 11500	4	1,883, 19833	4	2,211, 28750	4	2,539, 38800	4	2,867, 44833	4	3,195, 53167
5	246, 06250	5	674, 14583	5	1,230, 31250	5	1,558, 39583	5	1,886, 47917	5	2,214, 56833	5	2,542, 66833	5	2,870, 72917	5	3,198, 81250
6	249, 34333	6	677, 42667	6	1,233, 59333	6	1,561, 67667	6	1,889, 76000	6	2,217, 84833	6	2,545, 94833	6	2,874, 01000	6	3,202, 09333
7	252, 62417	7	680, 70750	7	1,236, 87417	7	1,564, 95750	7	1,893, 04083	7	2,221, 12417	7	2,549, 20750	7	2,877, 29083	7	3,205, 37417
8	255, 90500	8	684, 08833	8	1,240, 15500	8	1,568, 23833	8	1,896, 32167	8	2,224, 40500	8	2,552, 48833	8	2,880, 57167	8	3,208, 65500
9	259, 18583	9	687, 46917	9	1,243, 43583	9	1,571, 51917	9	1,899, 60250	9	2,227, 68583	9	2,555, 76917	9	2,883, 85250	9	3,211, 93583
80	262, 46667	180	560, 55000	380	1,246, 71667	480	1,574, 80000	580	1,902, 88333	680	2,230, 96667	780	2,529, 05000	880	2,887, 13383	980	3,215, 21667
1	265, 74750	1	683, 83083	1	1,249, 99750	1	1,578, 08083	1	1,906, 16417	1	2,234, 24750	1	2,532, 33683	1	2,890, 41417	1	3,218, 49750
2	269, 02833	2	687, 11167	2	1,253, 27833	2	1,581, 36167	2	1,909, 44500	2	2,237, 52833	2	2,535, 61833	2	2,893, 69500	2	3,221, 77833
3	272, 30917	3	690, 39250	3	1,256, 55917	3	1,584, 64250	3	1,912, 72583	3	2,240, 80917	3	2,538, 89960	3	2,896, 97583	3	3,224, 05917
4	275, 59000	4	693, 67333	4	1,259, 84000	4	1,587, 92333	4	1,916, 00667	4	2,244, 09000	4	2,542, 17333	4	2,900, 25667	4	3,228, 34000
5	278, 87083	5	696, 95417	5	1,263, 12083	5	1,591, 20417	5	1,919, 28750	5	2,247, 37083	5	2,545, 45417	5	2,903, 53750	5	3,231, 62083
6	282, 15167	6	700, 23500	6	1,266, 40167	6	1,594, 48500	6	1,922, 56833	6	2,250, 65167	6	2,548, 73500	6	2,906, 81833	6	3,234, 90167
7	285, 43250	7	703, 51583	7	1,269, 68250	7	1,597, 76583	7	1,925, 84917	7	2,253, 93250	7	2,551, 01583	7	2,910, 09917	7	3,238, 18250
8	288, 71333	8	706, 79667	8	1,272, 96333	8	1,601, 04667	8	1,929, 13000	8	2,257, 21333	8	2,554, 29667	8	2,913, 38000	8	3,241, 46333
9	291, 99417	9	710, 10750	9	1,276, 24417	9	1,604, 32750	9	1,932, 41083	9	2,260, 49417	9	2,557, 57750	9	2,916, 66083	9	3,244, 74417
90	295, 27500	100	693, 35833	300	1,279, 52500	400	1,607, 60833	500	1,935, 69167	600	2,263, 77500	700	2,591, 85833	800	2,919, 94167	900	3,248, 02500
1	301, 55583	1	696, 63917	1	1,282, 80583	1	1,610, 88917	1	1,938, 97250	1	2,267, 05583	1	2,594, 13917	1	2,923, 22250	1	3,251, 30583
2	304, 83667	2	699, 92000	2	1,286, 08667	2	1,614, 17000	2	1,942, 25333	2	2,270, 33667	2	2,597, 42000	2	2,926, 50333	2	3,254, 58667
3	308, 11750	3	703, 20083	3	1,289, 36750	3	1,617, 45083	3	1,945, 53417	3	2,273, 61750	3	2,601, 70083	3	2,929, 78417	3	3,257, 86750
4	308, 39833	4	706, 48167	4	1,292, 64833	4	1,620, 73167	4	1,948, 81500	4	2,276, 89833	4	2,604, 98167	4	2,933, 06500	4	3,261, 14833
5	309, 76250	5	709, 76250	5	1,295, 92917	5	1,624, 01260	5	1,952, 09583	5	2,279, 17917	5	2,608, 26250	5	2,936, 34583	5	3,264, 42917
6	314, 04000	6	714, 04000	6	1,299, 21000	6	1,627, 29333	6	1,955, 37667	6	2,282, 46000	6	2,611, 54333	6	2,939, 62667	6	3,267, 71000
7	318, 32117	7	718, 32117	7	1,302, 49083	7	1,630, 57417	7	1,958, 65750	7	2,285, 74083	7	2,614, 82417	7	2,942, 90750	7	3,270, 99083
8	321, 60167	8	721, 60167	8	1,305, 77167	8	1,633, 85500	8	1,961, 93833	8	2,289, 02167	8	2,618, 10500	8	2,946, 18833	8	3,274, 27167
9	324, 88250	9	724, 88250	9	1,309, 05250	9	1,637, 13583	9	1,965, 21917	9	2,293, 30250	9	2,621, 38583	9	2,949, 46917	9	3,277, 55250

GEOGRAPHIC POSITIONS.

Mouth of the Columbia River to Portland.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points.</i>							
Scarboro Hill 2, 1873.....	46 15 29.576 123 54 57.105	913.2 1223.1	330 47 02.6 6 45 52.0	150 57 02.8 186 43 42.8	Saddle Mountain 2..... Tillamook Head.....	Meters. 36736.3 32774.5	4.565095 4.515536
East Battery, 1911.....	46 16 46.107 124 02 39.557	1423.6 846.9	283 22 29.1 320 57 34.9 350 05 33.4	103 28 03.3 141 13 08.6 170 08 57.6	Scarboro Hill 2..... Saddle Mountain 2..... Tillamook Head.....	10180.9 44275.6 35436.0	4.007786 4.646164 4.549445
East Battery reference mark No. 1, ¹ 1911.	46 16 45.893 124 02 39.870	1417.0 853.6	225 23	45 23	East Battery.....	9.42	0.97405
East Battery reference mark No. 2, ¹ 1911.	46 16 46.040 124 02 39.755	1421.6 851.2	244 09	64 09	East Battery.....	4.71	0.67302
East Battery reference mark No. 3, ¹ 1911.	46 16 46.214 124 02 39.820	1426.9 852.5	300 25	120 25	East Battery.....	6.54	0.81558
Battery, 1873.....	46 16 37.486 124 02 51.852	1157.5 1110.2	281 36 22.4 320 28 30.6 349 35 37.6	101 42 05.4 140 44 13.3 169 39 10.6	Scarboro Hill 2..... Saddle Mountain 2..... Tillamook Head.....	10380.3 44236.0 35220.4	4.016212 4.645776 4.546794
Fort Stevens Longitude, 1911.....	46 12 27.600 123 57 39.853	852.2 854.3	141 12 57.4 211 48 35.6	321 09 20.9 31 50 33.1	East Battery..... Scarboro Hill 2.....	10243.8 6613.0	4.010461 3.820398
North Head Lighthouse, 1909.....	46 17 57.855 124 04 37.681	1786.4 806.5	317 35 47.7 346 53 47.8 353 29 34.8	137 37 04.2 166 58 37.1 173 32 08.2	Battery..... Tillamook Head..... Tillamook Rock Lighthouse.....	3360.1 38112.2 40456.7	3.526349 4.581064 4.606990
Point Adams (unused) Lighthouse, 1909.	46 11 37.388 123 58 29.760	1154.5 638.1	148 48 27.2 212 25 19.6	328 45 17.9 32 27 53.1	Battery..... Scarboro Hill 2.....	10834.9 8495.0	4.034825 3.929165
Desdemona Sands Lighthouse, 1909..	46 13 32.471 123 57 15.307	1002.6 328.0	24 11 43.5	204 10 49.8	Point Adams (unused) Light- house. Battery..... Scarboro Hill 2.....	3895.3 9198.0 4673.4	3.590543 3.963605 3.669634
Fort Stevens Wharf Light, 1909.....	46 12 32.543 123 57 05.562	1004.9 119.2	135 35 08.6 206 42 54.1	315 30 58.6 26 44 26.9	Battery..... Scarboro Hill 2.....	10594.2 6120.0	4.025070 3.786755
Cape Disappointment Lighthouse, 1873.	46 16 34.750 124 03 04.629	1073.0 99.1	280 51 40.4 320 07 50.0 314 14 07.4	100 57 32.7 140 23 41.8 134 19 35.6	Scarboro Hill 2..... Saddle Mountain 2..... Tansey Point 2.....	10632.2 44345.8 13600.7	4.026623 4.646853 4.133562
Island (U. S. E.), 1913.....	46 15 37.690 123 57 58.035	1163.8 1242.9	109 20 24.2 346 40 31.7 356 12 02.0	289 17 00.8 166 41 02.6 176 12 15.1	East Battery..... Desdemona Sands Light..... Fort Stevens Longitude.....	6387.8 3973.2 5882.2	3.805349 3.599141 3.769540
Island (U. S. E.) reference mark, ¹ 1913.	46 15 36.498 123 57 59.698	1126.9 1278.6	224 03 11	44 03 12	Island (U. S. E.).....	51.22	1.70944
Astoria, St. Mary's Hospital cross, 1909.	46 11 19.887 123 49 30.236	614.1 648.4	102 59 13.4 119 48 09.3 137 46 22.1	282 53 44.7 299 38 30.5 317 42 26.1	Fort Stevens Wharf Light..... Battery..... Scarboro Hill 2.....	10017.1 19779.0 10416.8	4.000741 4.296204 4.017735
Tansy Point 2, 1873.....	46 11 27.210 123 55 30.208	840.2 647.8	135 23 45.8 185 24 44.2	315 18 26.9 5 25 08.1	Battery..... Scarboro Hill 2.....	13466.0 7516.9	4.129239 3.876040
Smith Point, 1851.....	46 10 50.120 123 51 31.590	1547.6 677.5	102 38 17.7 126 24 42.8 152 58 36.7	282 35 25.5 306 16 31.6 332 56 08.3	Tansy Point 2..... Battery..... Scarboro Hill 2.....	5244.0 18098.1 9687.9	3.719662 4.257632 3.986228
Scarboro Hill, 1851.....	46 15 22.608 123 55 05.431	698.1 116.3	331 23 55.2 4 10 51.6 103 04 45.9	151 26 29.6 184 10 33.7 282 59 09.0	Smith Point..... Tansy Point 2..... Battery.....	9580.9 7287.6 10252.3	3.981405 3.862585 4.010822
Tansy Point, 1851.....	46 11 24.702 123 55 26.072	762.8 559.1	183 26 39.2 281 57 51.6	3 26 54.1 102 00 40.8	Scarboro Hill..... Smith Point.....	7359.0 5140.9	3.866817 3.711036
Point Adams, 1851.....	46 12 32.595 123 57 46.707	1006.5 1001.4	213 20 30.4 304 47 35.5	33 22 26.9 124 49 17.0	Scarboro Hill..... Tansy Point.....	6284.8 3672.4	3.798291 3.564950
Cape Disappointment, 1851.....	46 16 46.255 124 02 38.297	1428.3 819.9	284 52 03.2 321 23 43.1	104 57 30.4 141 27 13.7	Scarboro Hill..... Point Adams.....	10035.8 10018.2	4.001550 4.000790
Baker east base, 1851.....	46 18 14.932 123 58 33.873	461.1 725.0	319 59 31.7 62 23 58.3	140 02 02.3 242 21 01.6	Scarboro Hill..... Cape Disappointment.....	6944.5 5905.0	3.841639 3.771221
Baker west base, 1851.....	46 18 54.303 124 00 46.633	1676.8 997.7	293 09 15.6 31 09 46.6	113 10 51.6 211 08 25.9	Baker east base..... Cape Disappointment.....	3090.0 4619.9	3.489954 3.664634
Point Ellice, 1851.....	46 14 30.663 123 52 19.003	946.8 407.1	34 56 48.4 62 35 58.7	214 54 33.4 242 32 02.1	Tansy Point..... Point Adams.....	7003.3 7912.7	3.845900 3.898325
Astor Point, 1851.....	46 11 29.759 123 50 22.660	918.9 485.9	88 39 20.4 101 33 45.8 139 54 01.5 155 57 11.7	268 35 41.5 281 28 25.3 319 50 37.3 335 55 47.7	Tansy Point..... Point Adams..... Scarboro Hill..... Point Ellice.....	6508.3 9716.2 9402.9 6117.0	3.813465 3.987498 3.973262 3.786539

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
Grays Point, 1851.....	46 16 27.321 123 45 53.282	843.6 1140.9	32 09 58.7 06 28 52.4	212 06 44.2 246 24 13.7	Astor Point..... Point Ellice.....	<i>Meters.</i> 10850.4 9012.5	4.035444 3.954843
Tongue Point, 1851.....	46 12 48.310 123 45 24.501	1491.6 525.2	109 37 34.3 174 47 34.5	289 32 35.0 354 47 13.7	Point Ellice..... Grays Point.....	9428.1 6790.3	3.974426 3.831892
Rocky Point, 1851.....	46 15 38.304 123 36 42.175	1182.7 903.3	64 55 32.4 97 21 47.4	244 49 15.2 277 15 09.2	Tongue Point..... Grays Point.....	12361.2 11898.2	4.092059 4.075483
Indian Point, 1852.....	46 10 45.884 123 38 02.611	1416.7 56.6	111 47 42.8 190 48 20.8	291 42 23.9 10 49 18.9	Tongue Point..... Rocky Point.....	10200.6 9192.1	4.008625 3.963415
Cathlamet Point, 1851.....	46 14 00.036 123 30 58.054	1.1 1244.0	56 40 26.8 112 24 21.5	236 35 20.3 292 20 12.9	Indian Point..... Rocky Point.....	10899.0 7971.9	4.037388 3.901560
Jim Crow Point, 1851.....	46 15 39.931 123 33 48.564	1232.9 1040.1	310 09 40.5 190 48 49.0	130 11 43.7 210 55 45.6	Cathlamet Point..... Indian Point.....	4780.8 10587.0	3.679499 4.024772
Three Tree Point, 1851.....	46 16 03.673 123 31 09.843	113.4 210.8	356 12 49.6 77 50 42.6	176 12 58.1 257 48 47.9	Cathlamet Point..... Jim Crow Point.....	3825.9 3477.2	3.582728 3.541234
Aldrich, 1871.....	46 14 06.665 123 30 41.774	205.8 895.1	125 45 38.9 190 48 20.8	305 43 24.0 350 32 54.9	Jim Crow Point..... Three Tree Point.....	4929.9 3662.5	3.892836 3.563778
Skumaquea, 1871.....	46 16 18.907 123 27 05.700	583.8 122.1	48 36 06.9 84 52 59.9	228 33 30.8 264 50 03.5	Aldrich..... Three Tree Point.....	6172.0 5249.0	3.790423 3.720050
Quinn, 1871.....	46 13 36.188 123 28 54.716	1117.3 1172.6	147 34 15.1 204 55 06.7	327 32 37.5 24 56 25.4	Three Tree Point..... Skumaquea.....	5396.0 5540.4	3.732069 3.743540
Lokamin, 1871.....	46 14 32.240 123 23 20.081	095.4 430.3	76 27 49.4 124 17 55.7	256 23 47.8 304 15 12.7	Quinn..... Skumaquea.....	7376.2 5848.0	3.867833 3.767007
Hunts Mill Point, 1871.....	46 11 39.722 123 26 02.984	1226.5 64.0	134 20 44.4 213 13 40.0	314 18 40.5 33 15 37.6	Quinn..... Lokamin.....	5146.2 6369.1	3.711490 3.804075
Birnie, 1871.....	46 11 56.792 123 22 48.533	1753.5 1040.6	82 48 52.9 171 59 04.2	262 46 32.6 351 58 41.4	Hunts Mill Point..... Lokamin.....	4202.6 4847.0	3.623513 3.685477
Westport, 1871.....	46 07 56.489 123 22 45.620	1744.2 979.3	148 27 19.8 179 31 03.6	328 24 57.5 359 31 01.5	Hunts Mill Point..... Birnie.....	8089.3 7419.9	3.907913 3.870397
Anderson, 1872.....	46 09 54.059 123 19 39.194	1669.1 840.9	47 47 59.9 111 39 30.0	227 45 45.4 201 34 53.1	Westport..... Hunts Mill Point.....	5402.2 8854.6	3.732572 3.947171
Woods, 1873.....	46 06 46.373 123 19 10.958	1431.8 235.3	115 10 53.8 174 01 56.6	205 08 19.1 354 01 36.3	Westport..... Anderson.....	5092.0 5826.6	3.706892 3.765413
Cape Horn, 1873.....	46 09 09.977 123 17 16.335	308.0 350.5	29 02 21.9 72 14 01.0	209 00 59.3 252 10 03.6	Woods..... Westport.....	5070.9 7422.7	3.705083 3.870563
Clatskanie, 1873.....	46 07 13.156 123 14 08.403	406.2 182.4	82 46 27.6 131 50 00.4	262 42 49.6 311 47 45.0	Woods..... Cape Horn.....	6547.3 5410.0	3.816059 3.733194
Cooper, 1873.....	46 09 30.963 123 15 12.701	956.0 272.5	342 02 46.9 45 12 22.4	162 03 33.2 225 09 30.6	Clatskanie..... Woods.....	4472.6 7209.8	3.650557 3.857924
Bradbury, 1873.....	46 09 11.460 123 09 17.138	353.8 367.8	59 44 28.8 94 32 54.7	239 40 58.8 274 28 38.3	Clatskanie..... Cooper.....	7242.6 7653.3	3.859892 3.883849
Abernathy, 1873.....	46 11 16.009 123 10 53.120	494.3 1139.2	331 49 28.6 59 48 22.4	151 50 37.8 239 45 15.1	Bradbury..... Cooper.....	4362.1 6444.0	3.639697 3.809156
Nequally, 1873.....	46 11 24.019 123 07 56.859	741.6 1219.3	22 49 37.2 86 16 26.9	202 48 39.3 206 14 19.7	Bradbury..... Abernathy.....	4440.4 3788.0	3.647425 3.578407
Stoughton, 1873.....	46 10 06.131 123 08 09.614	180.3 206.2	121 36 59.9 186 29 20.2	301 35 01.9 6 29 29.4	Abernathy..... Nequally.....	4117.6 2420.4	3.614642 3.383887
Greens Point, 1873.....	46 10 00.249 123 05 45.907	7.7 984.8	93 23 07.9 132 39 13.7	273 21 24.2 312 37 39.2	Stoughton..... Nequally.....	3088.3 3818.3	3.489722 3.581867
Coal Creek Rldge, 1873.....	46 10 52.624 123 02 28.868	1624.8 619.1	69 04 56.5 97 52 45.1	249 02 34.4 277 48 48.5	Greens Point..... Nequally.....	4525.4 7100.6	3.655658 3.851295
Mount Solo, 1873.....	46 09 23.903 123 00 40.710	738.0 873.5	99 45 19.7 139 44 45.2	279 41 39.6 319 43 27.2	Greens Point..... Coal Creek Ridge.....	6643.6 3589.9	3.822403 3.555088
Rinearson, 1873.....	46 07 57.555 123 02 30.846	1777.1 662.2	180 27 00.1 221 32 58.7	0 27 01.5 41 34 18.1	Coal Creek Ridge..... Mount Solo.....	5405.6 3563.1	3.732843 3.551822
Huntington, 1873.....	46 09 09.530 122 57 10.680	294.2 229.2	72 06 39.3 115 01 55.5	252 02 48.5 294 58 06.0	Rinearson..... Coal Creek Ridge.....	7222.1 7531.9	3.858662 3.876903
Rainier, 1873.....	46 05 11.963 122 55 28.342	369.4 608.9	119 26 33.8 163 20 00.6	299 21 29.4 343 18 46.9	Rinearson..... Huntington.....	10414.9 7657.1	4.017654 3.884066
Coweman, 1873.....	46 06 26.688 122 52 36.950	824.0 793.6	57 56 33.7 130 34 41.4	237 54 30.2 310 31 24.2	Rainier..... Huntington.....	4344.8 7733.8	3.637968 3.888392

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
	° ' "		° ' "	° ' "		<i>Meters.</i>	
Mount Coffin, 1873.....	46 07 47.153 122 59 13.693	1455.9 294.0	226 03 28.0 286 13 07.0	46 04 56.7 106 17 53.5	Huntington..... Coweman.....	3666.1 8873.8	3.564208 3.948112
Mount Coffin reference mark, ¹ 1913...	46 07 46.158 122 59 13.593	1425.2 291.8	176 00 43	356 00 43	Mount Coffin.....	30.8	1.48855
Warren, 1873.....	46 05 03.563 122 54 58.090	110.0 1248.2	132 38 35.0 229 44 13.8	312 35 30.9 49 45 55.5	Mount Coffin..... Coweman.....	7459.7 3972.3	3.872720 3.599042
Carrolls Point, 1873.....	46 04 09.408 122 52 03.317	290.5 71.3	114 01 02.4 170 19 45.6	293 58 56.5 350 19 21.4	Warren..... Coweman.....	4111.0 4299.8	3.613947 3.633444
Galloway, 1873.....	46 04 00.965 122 53 41.088	29.8 883.1	197 01 18.5 262 55 05.4	17 02 04.7 82 56 15.8	Coweman..... Carrolls Point.....	4705.6 2117.4	3.672614 3.325800
Carr, 1873.....	46 02 44.830 122 53 01.871	1384.3 40.2	160 16 30.0 205 43 41.9	340 16 01.8 25 44 24.1	Galloway..... Carrolls Point.....	2497.3 2898.9	3.397467 3.462232
Carr reference mark, ¹ 1913.....	46 02 44.056 122 53 01.881	1360.2 40.4	180 30 50	0 30 50	Carr.....	23.9	1.37840
Drays Mound, 1873.....	46 02 38.690 122 51 36.103	1194.6 776.3	95 52 40.8 133 24 26.7 341 33 47.9	275 51 39.1 313 22 56.7 164 34 35.2	Carr..... Galloway..... Rocky Ridge.....	1853.8 3697.5 5313.1	3.268059 3.567909 3.725346
Gobles Point, 1873.....	46 01 04.653 122 52 30.877	143.7 664.2	167 50 31.7 202 04 41.2 310 32 19.2 343 45 17.2	347 50 09.4 22 05 20.6 130 33 45.9 163 45 45.9	Carr..... Drays Mound..... Rocky Ridge..... Hunter.....	3164.0 3133.3 3411.9 3068.2	3.500237 3.496002 3.532994 3.486885
Rocky Ridge, 1878.....	45 59 52.811 122 50 30.382	1630.5 653.7	332 42 48.2 25 29 33.4 67 16 28.2	152 43 34.2 205 28 25.3 247 15 30.2	Hoffman..... Merrill..... Hunter.....	3002.0 4740.1 1881.1	3.477413 3.675790 3.274419
Hunter, 1873.....	45 59 29.266 122 51 51.003	903.6 1097.6	301 56 42.5 307 20 38.7 4 53 32.4	121 58 26.4 127 28 58.4 184 53 22.2	Hoffman..... Martins Bluff..... Merrill.....	3667.3 5270.2 3565.0	3.564343 3.721826 3.552059
Hoffman, 1878.....	45 58 26.395 122 49 26.454	814.9 569.5	319 42 50.4 64 46 15.8	139 43 26.2 244 44 21.7	Martins Bluff..... Merrill.....	1657.5 3777.0	3.219446 3.577149
Martins Bluff, 1878.....	45 57 45.441 122 48 36.682	1402.9 789.8	308 55 50.1 359 46 04.9	128 58 10.2 179 46 05.9	Burnt Hill..... Adams.....	5399.4 7054.1	3.732346 3.848442
Martins Bluff reference mark, ¹ 1913...	45 57 45.523 122 48 36.243	1405.5 780.4	75 00 50	255 00 50	Martins Bluff.....	9.78	0.99034
Merrill, 1878.....	45 57 34.222 122 52 05.122	1056.6 110.3	265 33 58.1 289 17 23.1 333 32 27.4	85 36 27.9 109 22 13.0 153 33 57.0	Martins Bluff..... Burnt Hill..... Maple Hill.....	4501.7 9207.9 6030.1	3.653381 3.964182 3.780321
Burnt Hill, 1878.....	45 55 55.504 122 45 21.726	1713.7 468.1	331 07 42.1 356 53 22.0 35 21 22.2	151 09 17.8 170 53 54.0 215 18 52.3	Lewis River Hills..... Fales..... Table Cliff.....	5951.6 17801.9 7777.7	3.774631 4.250467 3.890850
Maple Hill, 1878.....	45 54 39.354 122 50 00.463	1215.0 10.0	197 25 52.9 248 35 42.5 287 48 55.8	17 26 53.1 68 39 02.8 107 53 51.8	Martins Bluff..... Burnt Hill..... Lewis River Hills.....	6022.2 6450.2 9331.5	3.779757 3.809570 3.969951
Lewis River Hills, 1878.....	45 53 06.677 122 43 08.454	206.1 182.3	14 04 12.3 81 18 13.3	194 03 22.0 261 14 07.8	Reed..... Table Cliff.....	6224.2 7460.6	3.794082 3.872774
Reed, 1878.....	45 49 51.122 122 44 18.560	1578.4 400.6	3 29 49.6 38 21 29.8 57 25 44.3	183 29 36.4 218 15 34.1 237 19 04.9	Fales..... Bouser..... Scappoose.....	6537.8 17302.7 14285.7	3.815435 4.238113 4.154901
Table Cliff, 1878.....	45 52 29.999 122 48 50.409	926.2 1087.1	309 52 46.2 334 24 10.6 14 43 34.4 26 03 38.1	129 56 01.3 154 27 12.4 194 40 53.5 208 00 13.6	Reed..... Fales..... Bouser..... Scappoose.....	7646.0 12672.2 19108.0 14031.0	3.883436 4.102852 4.281216 4.147088
Scappoose, 1878.....	45 45 41.648 122 53 35.646	1285.8 770.4	298 54 26.7 335 59 43.2 347 24 16.3	119 02 43.1 156 03 58.4 167 24 59.8	Secrist..... Willamet..... Bouser.....	17136.5 18902.7 6019.5	4.233923 4.278586 3.779560
Fales, 1878.....	45 46 19.758 122 44 37.017	610.0 799.8	12 01 18.2 55 44 10.3 84 16 51.9	191 59 07.9 235 38 28.0 264 10 25.9	Willamet..... Bouser..... Scappoose.....	18945.7 12590.3 11698.3	4.277510 4.097233 4.068121
Secrist, 1881.....	45 41 12.753 122 42 02.400	393.7 51.9	2 02 43.4 38 52 54.6	186 02 23.1 218 48 53.8	Baleh..... Willamet.....	17243.6 11624.2	4.236628 4.065363
Bouser, 1878.....	45 42 31.365 122 52 34.962	968.3 756.2	279 59 36.5 330 48 38.2	100 07 09.2 150 52 09.8	Secrist..... Willamet.....	13899.1 13146.2	4.142986 4.118789
Willamet, 1881.....	45 36 19.521 122 47 39.108	602.7 847.5	261 20 00.8 320 42 18.7	81 26 59.2 140 45 58.9	Farney..... Baleh.....	12832.3 10564.8	4.108805 4.023861

¹No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
	° ' "		° ' "	° ' "		Meters.	
Harney, 1881.....	45 37 21.734 122 37 53.538	671.0 1159.9	328 15 53.08 40 59 24.33	148 18 43.96 220 54 19.74	Rocky Butte..... Barnes.....	9866.53 14110.22	3.9941643 4.1495337
Warren, 1903.....	45 48 33.229 122 52 08.679	1025.9 187.4	225 52 07.84 296 26 15.40 343 29 22.08	46 03 54.50 116 59 49.53 163 34 28.69	Davis..... Larch..... Barnes.....	29504.23 68230.27 32731.73	4.4698843 4.8339771 4.5149689
Barnes, 1903.....	45 31 36.526 122 45 00.031	1127.6 0.7	357 18 16.35 30 59 06.87	177 19 51.87 210 42 21.69	Hult..... Yam.....	62886.70 60103.71	4.7971754 4.7789013
Rocky Butte, 1889.....	45 32 49.861 122 33 54.308	1539.3 1177.8	81 09 27.93 140 59 23.21 177 15 37.04	261 01 32.80 320 46 20.26 357 14 17.96	Barnes..... Warren..... Davis.....	14620.66 37539.95 49689.84	4.1649670 4.5744937 4.6962679
Fir, 1903.....	45 31 23.055 122 44 46.238	711.8 1003.6	295 11 01.5 8 09 29.8	115 11 39.9 188 09 23.5	Cem..... Hill.....	1293.0 1343.7	3.111594 3.128313
Monument, General Land Survey, 1903.	45 31 11.933 122 44 34.806	368.4 755.4	23 58 29.5 144 09 14.0	203 58 15.0 324 09 05.8	Hill..... Fir.....	1079.9 423.6	3.033393 2.629998
Hill, 1903.....	45 30 39.970 122 44 55.023	1234.0 1194.3	176 28 18.0 240 10 43.2	356 26 14.4 60 11 27.9	Barnes..... Cem.....	1749.4 1568.4	3.242892 3.195498
Cem, 1903.....	45 31 05.230 122 43 52.328	161.5 1135.8	123 20 05.0 198 44 43.5	303 19 16.7 18 45 53.8	Barnes..... River.....	1758.5 6640.3	3.245153 3.822185
River, 1903.....	45 34 28.89 122 42 13.91	891.9 301.6	285 42 28.7 34 07 13.5	105 48 25.4 214 05 14.9	Rocky Butte..... Barnes.....	11258.5 6426.7	4.0514797 3.8079902
Oregonian, 1903.....	45 31 13.21 122 40 38.97	407.8 845.8	161 11 03.4 251 11 25.6	341 09 55.6 71 16 14.4	River..... Rocky Butte.....	6382.8 9273.7	3.8050088 3.9672517
Portland longitude station, 1887.....	45 31 08.82 122 40 39.75	272.3 862.7					
Portland latitude station, 1887.....	45 31 08.83 122 40 39.84	272.6 864.5	187 56 52	7 56 53	Oregonian.....	136.6	2.13537
Portland bench mark (U. S. G. S.).....	45 31 09.07 122 40 39.77	280.0 863.1			Oregonian.....	128.7	2.10969
Balch, 1881.....	45 31 54.574 122 42 30.763	1684.8 667.4	80 15 16.28 210 43 44.61 261 17 15.30	260 13 29.77 30 47 02.60 81 23 23.91	Barnes..... Harney..... Rocky Butte.....	3286.69 11753.53 11334.39	3.5167584 4.0701684 4.0543981
S. (U. S. E.), 1913.....	46 15 23.539 123 55 02.654	726.8 56.8	31 52 36.3 96 39 10.5	211 50 42.1 276 37 03.8	Gun (U. S. E.)..... Island (U. S. E.).....	6419.2 3781.6	3.807480 3.577677
Baker (new), 1913.....	46 17 37.805 123 58 05.940	1167.3 127.2	316 33 08.8 357 23 11.0	136 35 21.2 177 23 16.7	S. (U. S. E.)..... Island (U. S. E.).....	5708.6 3712.6	3.756527 3.569677
H. (U. S. E.), 1913.....	46 16 03.574 124 00 37.203	110.3 796.7	228 02 50.6 279 45 18.6 330 30 28.6 116 38 11.0	48 04 39.9 99 49 20.3 150 32 36.1 296 36 42.7	Baker (new)..... S. (U. S. E.)..... Gun (U. S. E.)..... East Battery.....	4353.5 7270.8 7682.5 2930.4	3.638843 3.861580 3.885501 3.466933
I (U. S. E.), 1913.....	46 17 21.098 124 01 18.213	651.4 389.9	262 50 10.3 339 51 11.6 58 11 22.2	82 52 29.3 159 51 41.3 238 10 23.6	Baker (new)..... I (U. S. E.)..... East Battery.....	4147.8 2549.6 2049.3	3.617822 3.406475 3.311600
Wallcut (U. S. E.), 1913.....	46 18 41.990 123 59 20.314	1296.5 434.8	321 13 22.4 45 18 11.8	141 14 16.2 225 16 46.6	Baker (new)..... I (U. S. E.).....	2541.8 3550.4	3.405149 3.550272
Bluff (U. S. E.), 1913.....	46 18 28.384 124 01 47.471	876.4 1015.8	262 23 09.3 343 13 26.9	82 24 55.7 163 13 48.1	Wallcut (U. S. E.)..... I (U. S. E.).....	3176.7 2169.9	3.501983 3.336437
Point (U. S. E.), 1913.....	46 17 47.159 124 02 53.201	1456.1 1188.9	227 51 05.8 291 34 57.5 351 11 20.3	47 51 53.3 111 36 06.2 171 11 30.4	Bluff (U. S. E.)..... I (U. S. E.)..... East Battery.....	1897.1 2186.6 1907.6	3.278093 3.339772 3.280492
Chinook (U. S. E.), 1913.....	46 16 50.516 123 57 19.965	1559.8 427.6	100 30 45.8 143 12 06.8	280 27 53.6 323 10 39.8	I (U. S. E.)..... Wallcut (U. S. E.).....	5187.0 4299.1	3.714915 3.633374
Sands, 1913.....	46 12 35.471 123 52 36.355	1035.2 779.4	300 15 05.5 106 25 47.9	120 20 19.9 286 22 26.6	St. Marys Hospital..... Desdemona Sands Lighthouse...	4622.9 6232.6	3.664912 3.794609
Point Ellice (U. S. E.), 1913.....	46 14 31.104 123 52 17.703	960.4 379.3	328 41 03.3 6 23 23.4 74 10 50.6	148 43 04.2 186 23 00.9 254 07 15.7	St. Marys Hospital..... Sands..... Desdemona Sands Lighthouse...	6909.7 3592.6 6628.9	3.839457 3.55411 3.821440
Point Ellice (U. S. E.) reference mark No. 1, ¹ 1913.	46 14 31.288 123 52 16.909	966.0 362.3	71 31 11	251 31 10	Point Ellice (U. S. E.).....	17.925	1.25346
Point Ellice (U. S. E.) reference mark No. 2, ¹ 1913.	46 14 31.742 123 52 17.562	980.1 376.3	8 43 10	188 43 10	Point Ellice (U. S. E.).....	19.93	1.29951
Harrington (U. S. E.), 1913.....	46 16 03.367 123 40 04.735	104.0 101.4	338 24 13.6 49 03 33.4 95 08 32.9	158 25 32.9 228 59 39.0 275 04 08.3	Water..... Tongue (U. S. E.)..... Grays (U. S. E.).....	6398.3 9209.3 7872.0	3.806066 3.964226 3.896085
Harrington (U. S. E.) reference mark, ¹ 1913.	46 16 02.897 123 40 03.699	89.4 79.2	123 10 43	303 10 43	Harrington (U. S. E.).....	26.5	1.42225

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
	° ' "		° ' "	° ' "		Meters.	
Taylor, 1913.....	46 13 31.917 123 47 07.551	985.5 161.8	36 53 48.4 105 24 23.8	216 52 05.4 285 20 39.8	St. Marys Hospital..... Point Ellice (U. S. E.).....	5096.6 6892.5	3.707280 3.838374
Grays (U. S. E.), 1913.....	46 16 26.056 123 46 10.903	804.5 233.5	12 43 23.9 24 20 06.1 65 43 26.0	192 42 43.0 204 17 42.2 245 39 01.0	Taylor..... St. Marys Hospital..... Point Ellice (U. S. E.).....	5512.0 10973.6 8620.7	3.741311 4.015929 3.935542
Tongue (U. S. E.), 1913.....	46 12 47.794 123 45 29.272	1475.7 627.4	110 03 54.0 122 54 11.8 172 27 55.0	289 58 59.0 302 53 00.8 352 27 24.9	Point Ellice (U. S. E.)..... Taylor..... Grays (U. S. E.).....	9315.8 2508.6 6797.9	3.969218 3.399426 3.832375
Tongue (U. S. E.) reference mark, 1913.	46 12 47.430 123 45 29.534	1464.4 633.1	206 30 24	26 30 24	Tongue (U. S. E.).....	12.57	1.09934
Water, 1913.....	46 12 50.076 123 38 14.869	1564.7 318.7	89 29 45.5 123 09 19.9	269 24 31.9 303 03 36.1	Tongue (U. S. E.)..... Grays (U. S. E.).....	9312.0 12175.0	3.969042 4.085408
Rocky Point 2, 1913.....	46 15 38.408 123 36 42.048	1185.9 900.5	21 01 00.1 65 03 05.1 96 56 36.5	200 59 53.0 244 56 44.3 276 49 45.4	Water..... Tongue (U. S. E.)..... Grays (U. S. E.).....	5547.7 12464.4 12270.2	3.744112 4.095670 4.088852
Rocky Point 2 reference mark, ¹ 1913.	46 15 38.886 123 36 41.499	1200.7 888.8	38 31 20	218 31 20	Rocky Point 2.....	18.87	1.27577
Wharf, 1913.....	46 13 40.309 123 35 36.758	1244.6 787.7	65 40 55.4 159 01 13.4 130 39 27	245 39 01.1 339 00 26.2 310 39 27	Water..... Rocky Point 2..... Jim Crow Point.....	3719.1 3905.6 2.20	3.570449 3.591683 0.84242
Jim Crow (U. S. E.), 1913.....	46 15 39.883 123 33 48.486	1231.5 1038.4	32 08 59.2 47 53 22.8 89 18 52.8	212 07 41.0 227 30 10.3 209 16 47.4	Wharf..... Water..... Rocky Point 2.....	4360.2 7737.7 3717.4	3.639510 3.888610 3.570244
Raspberry (U. S. E.), 1913.....	46 14 08.773 123 30 46.898	270.9 1004.9	81 58 31.4 125 53 34.4	261 55 02.0 305 51 23.2	Wharf..... Jim Crow (U. S. E.).....	6273.0 4800.6	3.797478 3.681295
Three Tree Point (U. S. E.), 1913.....	46 16 03.406 123 31 09.704	105.2 207.8	352 08 21.9 52 20 49.4 77 57 36.1 160 04 51	172 08 38.4 232 17 36.5 257 55 41.4 340 04 51	Raspberry (U. S. E.)..... Wharf..... Jim Crow (U. S. E.)..... Three Tree Point.....	3573.0 7228.4 3477.1 8.77	3.553035 3.859041 3.541216 0.94300
Lower Skumaquea Light, June, 1913.	46 16 04.654 123 27 40.184	143.7 860.5	48 12 08.6 89 31 44.3	228 09 53.7 209 29 12.9	Raspberry (U. S. E.)..... Three Tree Point (U. S. E.).....	5366.4 4486.9	3.729680 3.651942
Ten, 1913.....	46 14 39.622 123 27 06.215	1223.4 133.1	78 37 55.8 116 24 27.7 164 30 51.3	258 35 16.4 296 21 31.8 344 30 26.8	Raspberry (U. S. E.)..... Three Tree Point (U. S. E.)..... Lower Skumaquea Light.....	4823.1 5521.6 2724.5	3.683328 3.765043 3.435279
Ten reference mark ¹	46 14 39.638 123 27 06.261	1223.9 134.1	296 24 28	116 24 28	Ten.....	1.1	0.04139
Stump, 1913.....	46 15 24.775 123 26 48.351	765.0 1035.6	15 21 00.0 137 53 11.8	195 20 47.1 317 57 34.4	Ten..... Lower Skumaquea Light.....	1445.7 1637.8	3.160085 3.219545
Dike, 1913.....	46 13 43.613 123 25 19.992	1346.6 428.4	127 14 22.2 145 25 24.4 148 47 27.9	307 13 05.5 325 23 43.2 328 46 24.1	Ten..... Lower Skumaquea Light..... Stump.....	2858.5 5200.0 3652.4	3.456131 3.723454 3.562575
Dike reference mark, ¹ 1913.....	46 13 44.033 123 25 18.490	1360.2 396.2	67 06 22	247 06 21	Dike.....	34.94	1.54332
Mud, 1913.....	46 13 46.094 123 26 04.307	1423.2 92.3	162 47 50.7 274 36 28.4	342 47 18.9 94 37 00.4	Stump..... Dike.....	3189.7 952.7	3.503745 2.978969
Tree, 1913.....	46 07 09.447 123 00 09.454	291.7 203.0	116 05 15.6 225 47 41.7	296 03 33.7 45 48 21.9	Rinearson..... Mount Coffin.....	3379.5 1669.9	3.528855 3.222694
Barlow, 1913.....	46 08 42.274 123 01 43.157	1305.4 926.2	324 53 42.6 36 33 21.6	144 56 50.1 216 32 47.2	Tree..... Rinearson.....	3501.5 1718.8	3.544260 3.235222
Barlow reference mark, No. 1, ¹ 1913.	46 08 43.731 123 01 44.976	1350.2 965.3	319 02 58	139 02 59	Barlow.....	59.58	1.77510
Barlow reference mark, No. 2, ¹ 1913.	46 08 44.046 123 01 43.800	1360.0 940.1	345 50 54	165 50 54	Barlow.....	56.435	1.75155
Quarry (U. S. E.), 1913.....	46 07 42.832 122 59 18.383	1322.5 394.6	46 46 25.9 96 17 52.0	226 45 49.1 276 15 33.3	Tree..... Rinearson.....	1504.9 4156.6	3.177522 3.618742
Slaughter 2 (U. S. E.), 1913.....	46 07 06.669 122 58 10.209	205.9 219.1	91 55 49.3 105 42 34.3 122 52 23.1 127 20 41.1 132 31 46.4	271 54 23.4 285 39 26.5 302 49 49.7 307 19 52.0 312 31 00.7	Tree..... Rinearson..... Barlow..... Quarry (U. S. E.)..... Mount Coffin.....	2561.9 5812.1 5441.6 1841.0 1349.4	3.408555 3.764333 3.735726 3.265045 3.267020
Slaughter 2 (U. S. E.) reference mark, No. 1, ¹ 1913.	46 07 10.164 122 58 11.025	313.8 236.7	350 46 53	170 46 54	Slaughter 2 (U. S. E.).....	109.32	2.03870
Slaughter 2 (U. S. E.) reference mark, No. 2, ¹ 1913.	46 07 08.272 122 58 08.226	255.4 178.6	40 42 05	220 42 04	Slaughter 2 (U. S. E.).....	65.30	1.81491
Curve (U. S. E.), 1912.....	46 06 34.724 122 59 13.144	1072.1 282.3	176 56 19.7 233 52 13.4	356 56 15.9 53 52 58.7	Quarry (U. S. E.)..... Slaughter 2 (U. S. E.).....	2105.9 1673.1	3.323442 3.223526

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Tangent (U. S. E.), 1912.....	46 06 06.453 122 58 09.651	199.2 207.3	122 37 50.0 179 37 51.2	302 37 04.3 359 37 50.8	Curve (U. S. E.)..... Slaughter 2 (U. S. E.).....	Meters. 1619.1 1859.3	3.209273 3.269345
Beach 2 (U. S. E.), 1912.....	46 06 39.452 122 57 34.757	1218.1 746.4	36 20 19.7 137 49 49.3	216 19 54.6 317 49 23.8	Tangent (U. S. E.)..... Slaughter 2 (U. S. E.).....	1264.8 1133.9	3.102024 3.054577
Bourne (U. S. E.), 1912.....	46 05 50.121 122 57 32.692	1547.5 702.2	122 25 37.9 178 19 55.3	302 25 11.3 358 19 53.8	Tangent (U. S. E.)..... Beach 2 (U. S. E.).....	940.5 1523.8	2.973349 3.182924
A 2 (U. S. E.), 1912.....	46 06 22.442 122 57 07.231	692.9 155.3	28 43 32.0 69 47 26.3	208 43 13.6 249 46 41.3	Bourne (U. S. E.)..... Tangent (U. S. E.).....	1138.0 1428.7	3.056128 3.013185
Hut (U. S. E.), 1912.....	46 06 09.338 122 56 38.523	288.3 827.5	62 59 11.2 123 16 32.6	242 58 32.2 303 16 12.0	Bourne (U. S. E.)..... A 2 (U. S. E.).....	1306.1 737.5	3.115972 2.867754
Mill (U. S. E.), 1912.....	46 05 37.624 122 56 53.522	1161.7 1149.8	114 38 17.6 198 12 42.4	294 37 49.4 18 12 53.2	Bourne (U. S. E.)..... Hut (U. S. E.).....	925.7 1020.8	2.966457 3.013185
Wood 2 (U. S. E.), 1912.....	46 05 59.851 122 56 13.126	1847.9 281.9	51 39 54.7 118 14 16.2	231 39 25.6 298 13 57.9	Mill (U. S. E.)..... Hut (U. S. E.).....	1106.3 619.2	3.043875 2.791811
Dock (U. S. E.), 1912.....	46 05 35.092 122 56 30.050	1083.5 645.6	170 14 04.9 205 25 55.6	350 13 58.8 25 26 07.8	Hut (U. S. E.)..... Wood 2 (U. S. E.).....	1072.9 846.5	3.030570 2.927624
Net 2 (U. S. E.), 1912.....	46 05 55.825 122 55 48.708	1723.6 1046.2	54 13 08.6 103 20 07.3	234 12 38.8 283 19 49.7	Dock (U. S. E.)..... Wood 2 (U. S. E.).....	1094.7 539.0	3.039313 2.731610
Ranier 2 (U. S. E.), 1912.....	46 05 23.782 122 55 53.635	734.3 1152.3	159 23 49.7 186 06 21.4	339 23 35.7 6 06 25.0	Wood 2 (U. S. E.)..... Net 2 (U. S. E.).....	1189.8 995.0	3.075458 2.997518
Bluff (U. S. E.), 1912.....	46 05 12.591 122 55 14.075	388.8 302.4	112 07 44.8 150 52 14.7	292 07 16.3 330 51 49.8	Ranier 2 (U. S. E.)..... Net 2 (U. S. E.).....	917.5 1528.2	2.962587 3.184185
Cowlitz 2 (U. S. E.), 1912.....	46 05 0.078 122 54 43.814	2.4 941.1	23 54 49.3 84 37 27.6	203 54 27.5 264 36 40.9	Bluff (U. S. E.)..... Net 2 (U. S. E.).....	1603.9 1400.1	3.205165 3.146148
D 10 (U. S. E.), 1912.....	46 05 08.188 122 53 31.644	252.8 679.9	93 32 42.4 135 56 53.8	273 31 28.6 315 56 01.8	Bluff (U. S. E.)..... Cowlitz 2 (U. S. E.).....	2204.9 2229.5	3.343388 3.348202
D 9 (U. S. E.), 1912.....	46 04 45.917 122 54 19.403	1417.7 416.9	167 06 09.6 236 10 08.9	347 05 52.0 56 10 43.3	Cowlitz 2 (U. S. E.)..... D 10 (U. S. E.).....	2349.1 1235.3	3.370897 3.091758
D 8 (U. S. E.), 1912.....	46 04 42.860 122 53 09.098	1323.3 195.5	93 34 55.6 148 13 30.7	273 34 05.0 328 13 14.5	D 9 (U. S. E.)..... D 10 (U. S. E.).....	1513.6 919.9	3.180025 2.963748
D 7 (U. S. E.), 1912.....	46 04 23.417 122 53 54.051	723.0 1161.6	199 12 01.5 238 08 09.9	19 12 17.7 58 08 42.3	D 10 (U. S. E.)..... D 8 (U. S. E.).....	1463.8 1137.3	3.165479 3.055885
D 6 (U. S. E.), 1912.....	46 04 13.175 122 52 44.837	406.8 963.5	102 00 31.1 150 22 11.7	281 59 41.2 330 21 54.2	D 7 (U. S. E.)..... D 8 (U. S. E.).....	1520.7 1054.4	3.182035 3.023020
D 5 (U. S. E.), 1912.....	46 03 52.049 122 53 35.460	1607.0 762.1	199 51 11.7 239 03 05.4	19 51 30.7 59 03 41.9	D 8 (U. S. E.)..... D 6 (U. S. E.).....	1668.0 1268.5	3.222186 3.103302
D 4 (U. S. E.), 1912.....	46 03 08.083 122 52 06.546	249.6 140.7	125 23 34.6 157 43 58.2	305 22 30.6 337 43 30.7	D 5 (U. S. E.)..... D 6 (U. S. E.).....	2344.3 2171.8	3.370012 3.336810
D 3 (U. S. E.), 1912.....	46 02 54.549 122 53 04.532	1684.2 97.4	189 53 23.7 251 27 48.7	9 53 36.9 71 28 30.4	D 6 (U. S. E.)..... D 4 (U. S. E.).....	2464.2 1314.8	3.391681 3.118854
D 1 (U. S. E.), 1912.....	46 02 18.043 122 52 52.830	557.1 1136.0	167 25 02.7 212 46 50.5	347 24 54.3 32 47 23.8	D 3 (U. S. E.)..... D 4 (U. S. E.).....	1154.9 1837.7	3.062541 3.264286
D 2 (U. S. E.), 1912.....	46 02 26.711 122 52 25.626	824.7 551.0	65 25 04.7 135 46 52.3	245 24 45.1 315 46 24.3	D 1 (U. S. E.)..... D 3 (U. S. E.).....	643.3 1199.4	2.808396 3.078959
Kalama (U. S. E.), 1912.....	46 02 13.622 122 52 19.974	420.6 429.5	100 56 13.6 163 15 33.5	280 55 49.9 343 15 29.4	D 1 (U. S. E.)..... D 2 (U. S. E.).....	719.6 422.0	2.857092 2.625316
Coffin Rock (U. S. E.), 1912.....	46 02 03.873 122 52 48.422	119.6 1041.3	167 46 27.0 243 47 57.0	347 46 23.8 63 48 17.5	D 1 (U. S. E.)..... Kalama (U. S. E.).....	447.6 681.8	2.650931 2.833659
H 27 (U. S. E.), 1912.....	46 01 43.734 122 52 02.957	1350.3 63.6	122 27 31.4 158 22 13.1	302 26 58.7 338 22 00.9	Coffin Rock (U. S. E.)..... Kalama (U. S. E.).....	1158.7 992.7	3.063986 2.996827
H 30 ₁ (U. S. E.), 1912.....	46 01 09.920 122 52 28.212	306.3 606.9	68 15 14.3 165 22 40.4 207 23 10.7 302 58 48.6 357 14 58.7	248 15 12.4 345 22 25.9 27 29 28.9 123 00 07.0 177 15 00.4	Knight..... Coffin Rock (U. S. E.)..... H 27 (U. S. E.)..... Kalama..... H 28 (U. S. E.).....	61.6 1721.6 1176.9 2794.0 1103.0	1.789845 3.235930 3.070731 3.446224 3.042576
Mill (U. S. E.), 1912.....	46 01 22.971 122 51 44.336	709.2 953.7	30 38 04.3 66 53 03.1 66 57 44.2 148 00 24.8 323 57 57.5 330 48 55.6	210 37 34.4 246 52 31.5 246 57 10.7 328 00 11.4 143 58 44.3 150 49 47.8	H 28 (U. S. E.)..... H 30 ₁ (U. S. E.)..... Knight..... H 27 (U. S. E.)..... Kalama..... H 23 ₁ (U. S. E.).....	1748.7 1026.2 1087.8 755.9 2379.4 3204.3	3.242709 3.011233 3.036559 2.878454 3.376467 3.505738
H 28 (U. S. E.), 1912.....	46 00 34.237 122 52 25.751	1057.1 554.0	297 46 45.3 332 06 03.9	117 48 07.3 152 06 46.1	H 23 ₂ (U. S. E.)..... Sluo.....	2773.4 2733.3	3.443011 3.436094
Bank, 1913.....	46 01 42.453 122 52 04.455	1310.7 95.8	28 57 02.9 147 20 34.9	208 56 43.9 327 19 53.6	Knight..... Carr.....	1174.0 2287.7	3.069962 3.359898

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Bank reference mark, ¹ 1913.....	46 01 42.509 122 52 02.923	1312.5 62.9	86 58 21	266 58 20	Bank.....	Meters. 33.0	1.51851
Cahle, 1913.....	46 02 21.121 122 52 28.700	652.1 618.5	336 21 14.7 1 10 21.0 135 48 02.2	156 21 32.2 181 10 19.5 315 47 38.4	Bank..... Knight..... Carr.....	1303.3 2221.7 1021.1	3.115042 3.346678 3.009083
Dock, 1913.....	46 03 12.334 122 53 08.892	380.8 191.1	331 22 28.8 349 55 05.8 155 01 49.7	151 22 57.7 169 55 10.9 335 01 30.6	Cable..... Carr..... D 5 (U. S. E.).....	1801.3 862.5 1352.7	3.255391 2.935757 3.131195
Rall, 1913.....	46 04 09.421 122 52 04.214	290.9 90.6	8 58 12.5 25 23 30.6 38 18 15.3	188 57 54.8 205 22 49.1 218 15 28.7	Cahle..... Carr..... Dock.....	3385.2 2890.9 2244.9	3.529582 3.461036 3.351193
Cotton, 1913.....	46 04 15.526 122 52 47.366	479.4 1018.0	281 29 06.5 353 32 16.4 6 21 16.5 13 20 35.8 54 57 48.3	101 29 37.6 173 32 29.8 186 21 06.1 193 20 20.3 234 57 13.7	Rall..... Cable..... Carr..... Dock..... D 5 (U. S. E.).....	946.3 3554.9 2817.6 2005.2 1262.5	2.976051 3.550824 3.449876 3.302159 3.101222
Cotton reference mark No. 1, ¹ 1913....	46 04 15.525 122 52 46.435	479.3 997.9	90 02 46	270 02 45	Cotton.....	20.0	1.30103
Cotton reference mark No. 2, ¹ 1913....	46 04 15.525 122 52 45.039	479.3 967.9	90 02 46	270 02 45	Cotton.....	50.0	1.69897
Cut, 1913.....	46 04 03.863 122 53 41.521	119.3 892.4	252 48 10.5 265 17 53.5 336 12 27.3	72 48 49.5 85 19 08.6 156 12 50.8	Cotton..... Rall..... Dock.....	1218.3 2098.3 1738.7	3.085758 3.321875 3.240231
Cut reference mark, ¹ 1913.....	46 04 03.979 122 53 40.980	122.9 880.7	72 48 10	252 48 10	Cut.....	12.17	1.08529
Cottonwood Island, 1913.....	46 04 43.040 122 53 10.718	1328.9 230.3	329 25 37.2 359 11 50.8 28 41 36.6	149 25 54.0 179 11 52.1 208 41 14.4	Cotton..... Dock..... Cut.....	986.6 2800.9 1378.9	2.994162 3.447293 3.139531
Cottonwood Island reference mark No. 1, ¹ 1913.	46 04 43.538 122 53 09.519	1344.3 204.5	59 10 56	239 10 55	Cottonwood Island.....	30.0	1.47712
Cottonwood Island reference mark No. 2, ¹ 1913.	46 04 44.036 122 53 08.320	1359.6 178.8	59 10 57	239 10 55	Cottonwood Island.....	60.0	1.77815
Old, 1913.....	46 04 43.324 122 54 15.755	1337.6 338.5	270 21 10.7 294 18 27.3	90 21 57.6 114 19 31.0	Cottonwood Island..... Cotton.....	1397.5 2084.3	3.145363 3.318965
Knight, 1913.....	46 01 09.180 122 52 30.873	283.4 664.1	167 16 59.7 203 04 42.4	347 16 37.4 23 05 21.8	Carr..... Drays Mound.....	3027.5 3004.2	3.481088 3.477728
Knight reference mark No. 1, ¹ 1913....	46 01 08.591 122 52 30.893	265.2 664.6	181 22 23	1 22 23	Knight.....	18.2	1.26007
Knight reference mark No. 2, ¹ 1913....	46 01 09.313 122 52 30.730	287.5 661.0	36 53 19	216 53 19	Knight.....	5.14	0.71096
Kalama, 1913.....	46 00 20.646 122 50 39.281	637.4 845.2	121 58 59.2 145 27 03.0 164 00 19.6	301 57 33.9 325 25 20.4 343 59 38.7	Knight..... Carr..... Drays Mound.....	2830.0 5405.9 4433.9	3.451791 3.732867 3.646789
Kalama reference mark ¹ , 1913.....	46 00 19.945 122 50 38.919	615.8 837.4	160 13 24	340 13 24	Kalama.....	22.99	1.36154
Slue, 1913.....	45 59 15.993 122 51 26.328	493.8 566.7	158 20 00.1 178 04 35.5 206 53 20.4	338 19 13.7 358 04 28.6 26 53 54.3	Knight..... Drays Mound..... Kalama.....	3760.5 6261.9 2238.2	3.575250 3.790704 3.349908
Slue reference mark No. 1, ¹ 1913.....	45 59 14.496 122 51 28.106	447.6 604.9	219 36 49	39 36 50	Slue.....	60.0	1.77815
Slue reference mark No. 2, ¹ 1913.....	45 59 15.245 122 51 27.217	470.7 535.8	219 36 49	39 36 50	Slue.....	30.0	1.47712
H 26 ₂ (U. S. E.), 1912.....	45 59 15.652 122 51 24.978	483.3 537.6	109 55 21	289 55 20	Slue.....	30.90	1.48996
Rock, 1913.....	45 59 43.290 122 50 22.257	1336.6 479.0	58 34 21.9 162 22 54.0	238 33 35.8 342 22 41.8	Slue..... Kalama.....	1616.1 1210.1	3.208402 3.082834
Rock reference mark, No. 1, ¹ 1913....	45 59 43.588 122 50 22.853	1345.8 491.8	305 40 35	125 40 35	Rock.....	15.8	1.19866
Rock reference mark, No. 2, ¹ 1913....	45 59 42.841 122 50 22.914	1322.7 493.1	225 33 42	45 33 42	Rock.....	19.8	1.29667
Flat, 1913.....	45 58 45.361 122 50 30.143	1400.5 648.9	128 01 56.9 176 10 36.1 185 25 12.7	308 01 16.5 356 10 29.6 5 25 18.4	Slue..... Kalama..... Rock.....	1535.3 2948.5 1796.6	3.186185 3.469603 3.254454
Flat reference mark, No. 1, ¹ 1913....	45 58 44.896 122 50 30.855	1386.2 664.2	226 51 21	46 51 21	Flat.....	21.00	1.32222

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
Flat reference mark, No. 2, ¹ 1913	45 58 44.561 122 50 31.367	1375.8 675.2	226 51 22	46 51 21	Flat.....	Meters. 36.10	1.55751
H 21 (U. S. E.), 1912	45 59 19.566 122 50 05.616	604.1 120.9	26 33 43.3 86 22 27.3 153 56 47.4	206 33 25.6 266 21 29.2 333 56 35.4	Flat..... Slue..... Rock.....	1180.7 1740.6 815.3	3.072137 3.240710 2.911340
H 21 (U. S. E.) reference mark, ¹ 1913	45 59 18.917 122 50 04.718	584.1 101.5	136 01 33	316 01 32	H 21 (U. S. E.).....	27.83	1.44451
H 23 ₂ (U. S. E.), 1912	45 59 52.356 122 50 31.724	1616.5 682.6	330 58 02.9 359 03 25.1 46 18 43.1 169 27 22.9	150 58 21.7 179 03 26.2 226 18 03.8 349 27 17.5	H 21 (U. S. E.)..... Flat..... Slue..... Kalama.....	1157.9 2068.8 1625.2 888.5	3.063657 3.315712 3.210918 2.948637
H 23 ₂ (U. S. E.) reference mark, ¹ 1913	45 59 52.432 122 50 30.839	1618.8 663.6	82 55 42	262 55 41	H 23 ₂ (U. S. E.).....	19.18	1.28285
H 22 (U. S. E.), 1912	45 58 14.588 122 49 53.515	450.4 1152.2	140 18 46.2 172 36 08.4	320 18 19.8 352 35 59.7	Flat..... H 21 (U. S. E.).....	1234.7 2023.1	3.091571 3.306009
H 22 (U. S. E.) reference mark, ¹ 1913	45 58 14.175 122 49 54.514	437.6 1173.8	239 20 09	59 20 10	H 22 (U. S. E.).....	25.0	1.39794
H 19 (U. S. E.), 1912	45 58 26.590 122 49 26.614	821.0 572.9	57 23 14.1 152 50 01.6	237 22 54.8 332 49 33.6	H 22 (U. S. E.)..... H 21 (U. S. E.).....	687.5 1838.5	2.837288 3.264467
H 19 (U. S. E.) reference mark, ¹ 1913	45 58 26.462 122 49 25.692	817.0 553.1	101 16 05	281 16 04	H 19 (U. S. E.).....	20.25	1.30642
Hill (U. S. E.), 1912	45 58 07.963 122 48 57.032	245.9 1227.9	99 33 14.7 132 05 10.1 327 46 49.5	279 32 34.1 312 04 48.8 147 47 04.1	H 22 (U. S. E.)..... H 19 (U. S. E.)..... Martins Bluff.....	1233.1 858.1 821.9	3.091004 2.933552 2.914806
Hill (U. S. E.) reference mark, ¹ 1913	45 58 08.246 122 48 57.442	254.6 1236.7	314 38 11	134 38 11	Hill (U. S. E.).....	12.42	1.09412
H 20 (U. S. E.), 1912	45 57 42.247 122 49 47.817	1304.4 1029.7	172 59 53.1 198 26 18.1 234 00 42.4 266 18 29.9	352 59 49.0 18 26 33.3 54 01 18.9 86 19 21.0	H 22 (U. S. E.)..... H 19 (U. S. E.)..... Hill (U. S. E.)..... Martins Bluff.....	1006.0 1443.2 1351.3 1534.9	3.002608 3.159326 3.130761 3.186084
H 20 (U. S. E.) reference mark, ¹ 1913	45 57 42.776 122 49 47.564	1320.7 1024.2	18 26 18	198 26 18	H 20 (U. S. E.).....	17.22	1.23603
Connel 2 (U. S. E.), 1912	45 56 59.120 122 49 17.342	1825.3 373.5	153 45 57.7 191 37 30.5 211 28 21.7	333 45 35.8 11 37 45.1 31 28 50.9	H 20 (U. S. E.)..... Hill (U. S. E.)..... Martins Bluff.....	1484.5 2170.1 1677.0	3.171583 3.336473 3.224524
Connel 2 (U. S. E.) reference mark, ¹ 1913	45 56 59.837 122 49 19.282	1847.4 415.3	297 54 36	117 54 37	Connel 2 (U. S. E.).....	47.27	1.67459
Martin 3 (U. S. E.), 1912	45 56 47.850 122 48 10.923	1477.4 235.3	103 40 30.4 158 07 54.0 162 40 29.8	283 39 42.7 338 07 20.8 342 40 11.3	Connel 2 (U. S. E.)..... Hill (U. S. E.)..... Martins Bluff.....	1472.3 2665.3 1862.6	3.167989 3.425748 3.270129
Martin 3 (U. S. E.) reference mark, ¹ 1913	45 56 47.863 122 48 10.165	1477.7 218.9	88 36 44	268 36 44	Martin 3 (U. S. E.).....	16.33	1.21289
H 16 ₂ (U. S. E.), 1912	45 55 45.844 122 49 05.836	1415.3 125.7	173 45 53.4 211 42 25.0	353 44 45.2 31 43 05.5	Connel 2 (U. S. E.)..... Martin 3 (U. S. E.).....	2275.9 2250.4	3.357145 3.352262
H 13 ₂ (U. S. E.), 1912	45 55 36.925 122 47 47.471	1400.6 1022.8	99 16 13.0 142 40 04.7 167 00 35.4	279 15 16.7 322 39 00.2 347 00 18.6	H 16 ₂ (U. S. E.)..... Connel 2 (U. S. E.)..... Martin 3 (U. S. E.).....	1710.8 3191.9 2247.3	3.233198 3.504048 3.351663
H 13 ₂ (U. S. E.) reference mark, ¹ 1913	45 55 36.218 122 47 46.850	1118.2 1009.4	148 29 58	328 29 58	H 13 ₂ (U. S. E.).....	25.6	1.40824
H 11 (U. S. E.), 1912	45 54 57.741 122 48 05.196	1782.8 112.0	138 39 43.2 197 31 11.9	318 38 59.6 17 31 24.6	H 16 ₂ (U. S. E.)..... H 13 ₂ (U. S. E.).....	1978.2 1268.6	3.296260 3.103327
H 11 (U. S. E.) reference mark, ¹ 1913	45 54 56.978 122 48 03.684	1759.1 79.4	125 51 58	305 51 57	H 11 (U. S. E.).....	40.2	1.60423
H 14 ₂ (U. S. E.), 1912	45 54 35.794 122 49 00.246	1105.1 5.3	176 48 40.5 219 43 02.7 240 15 47.1	356 48 36.5 39 43 55.0 60 16 26.7	H 16 ₂ (U. S. E.)..... H 13 ₂ (U. S. E.)..... H 11 (U. S. E.).....	2166.1 2453.9 1366.3	3.335670 3.389854 3.135543
H 14 ₂ (U. S. E.) reference mark, ¹ 1913	45 54 35.511 122 49 03.980	1096.4 85.8	263 48 37	83 48 40	H 14 ₂ (U. S. E.).....	80.95	1.90822
H 9 ₂ (U. S. E.), 1912	45 54 28.026 122 48 09.050	865.3 195.1	102 16 02.2 185 10 16.9	282 15 25.4 5 10 19.7	H 14 ₂ (U. S. E.)..... H 11 (U. S. E.).....	1129.2 921.2	3.052787 2.964342
H 9 ₂ (U. S. E.) reference mark, ¹ 1913	45 54 28.871 122 48 08.811	891.4 189.9	11 11 26	191 11 26	H 9 ₂ (U. S. E.).....	26.59	1.42472
Dock (U. S. E.), 1912	45 54 04.730 122 48 37.205	146.0 802.0	152 37 29.9 202 51 10.9 220 09 14.7	332 37 13.3 22 51 33.9 40 09 34.9	H 14 ₂ (U. S. E.)..... H 11 (U. S. E.)..... H 9 ₂ (U. S. E.).....	1080.1 1778.1 941.1	3.033448 3.249477 2.973630

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
H 7 ₂ (U. S. E.), 1912.....	45 54 10.374 122 48 03.081	320.3 66.4	76 40 19.6 166 43 02.0	256 39 55.1 346 42 57.7	Dock (U. S. E.)..... H 9 ₂ (U. S. E.).....	755.9 559.9	2.878492 2.748132
H 7 ₂ (U. S. E.) reference mark, ¹ 1913..	45 54 10.718 122 48 01.632	330.9 35.2	71 13 08	251 13 07	H 7 ₂ (U. S. E.).....	33.00	1.51851
H 8 ₂ (U. S. E.), 1912.....	45 53 33.049 122 48 20.336	1020.4 438.4	159 36 18.1 188 09 20.3 197 53 13.7	339 36 06.0 8 09 28.4 17 53 26.1	Dock (U. S. E.)..... H 9 ₂ (U. S. E.)..... H 7 ₂ (U. S. E.).....	1043.5 1714.7 1210.9	3.018493 3.234183 3.083118
H 8 ₂ (U. S. E.) reference mark, ¹ 1913..	45 53 31.924 122 48 21.775	985.6 469.5	221 46 13	41 46 14	H 8 ₂ (U. S. E.).....	46.57	1.66811
H 5 ₂ (U. S. E.), 1912.....	45 53 06.263 122 47 02.005	193.4 43.2	116 05 49.8 146 22 20.4	296 04 53.6 326 21 36.6	H 8 ₂ (U. S. E.)..... H 7 ₂ (U. S. E.).....	1890.5 2377.4	3.274283 3.376098
H 5 ₂ (U. S. E.) reference mark, ¹ 1913..	45 53 07.471 122 47 01.233	230.7 26.6	24 03 26	204 03 25	H 5 ₂ (U. S. E.).....	40.84	1.61109
H 6 ₂ (U. S. E.), 1912.....	45 52 32.310 122 47 56.173	997.5 1211.4	164 28 25.1 177 10 58.9 228 05 17.8	344 28 07.8 357 10 54.0 48 05 56.7	H 8 ₂ (U. S. E.)..... H 7 ₂ (U. S. E.)..... H 5 ₂ (U. S. E.).....	1946.3 3031.3 1569.5	3.289220 3.481635 3.195759
H 6 ₂ (U. S. E.) reference mark, ¹ 1913..	45 52 32.339 122 47 56.946	998.4 1228.2	273 07	93 07	H 6 ₂ (U. S. E.).....	16.7	1.22272
H 3 (U. S. E.), 1912.....	45 52 04.948 122 46 38.668	152.8 834.1	116 49 07.2 165 06 47.4	296 48 11.6 345 06 30.7	H 6 ₂ (U. S. E.)..... H 5 ₂ (U. S. E.).....	1873.0 1958.9	3.272530 3.292002
H 3 (U. S. E.) reference mark, ¹ 1913..	45 52 04.555 122 46 36.896	140.6 795.6	107 30 07	287 30 06	H 3 (U. S. E.).....	40.31	1.60541
H 4 (U. S. E.), 1912.....	45 51 23.527 122 47 29.564	726.4 637.8	164 52 41.9 190 36 37.1 220 38 29.9	344 52 22.8 10 36 56.8 40 39 06.4	H 6 ₂ (U. S. E.)..... H 5 ₂ (U. S. E.)..... H 3 (U. S. E.).....	2199.8 3227.1 1685.5	3.342389 3.508816 3.226720
H 4 (U. S. E.) reference mark, ¹ 1913..	45 51 21.996 122 47 29.093	679.1 627.7	167 52 30	347 52 30	H 4 ₂ (U. S. E.).....	48.35	1.68440
H 1 ₂ (U. S. E.), 1912.....	45 51 15.169 122 46 47.879	468.3 1033.0	106 00 47.6 187 21 53.5	286 00 17.7 7 22 00.1	H 4 (U. S. E.)..... H 3 (U. S. E.).....	935.6 1549.7	2.971104 3.190235
H 1 ₂ (U. S. E.) reference mark, ¹ 1913..	45 51 14.086 122 46 46.244	434.9 997.7	133 27 49	313 27 48	H 1 ₂ (U. S. E.).....	48.60	1.68664
Warrior (U. S. E.), 1912.....	45 50 56.760 122 47 18.192	1752.4 392.5	163 27 43.3 202 02 39.0 229 00 23.7	343 27 35.1 22 03 07.0 49 00 45.4	H 4 (U. S. E.)..... H 3 (U. S. E.)..... H 1 ₂ (U. S. E.).....	862.0 2271.3 866.4	2.935521 3.356273 2.937738
Warrior (U. S. E.) reference mark, ¹ 1913..	45 50 58.394 122 47 20.034	1802.9 432.3	321 46 08	141 46 09	Warrior (U. S. E.).....	64.24	1.80781
Lake (U. S. E.), 1912.....	45 50 35.966 122 46 56.253	1110.4 1213.9	143 35 52.2 153 55 16.0 188 29 17.1	323 35 36.5 333 54 52.0 8 29 23.1	Warrior (U. S. E.)..... H 4 (U. S. E.)..... H 1 ₂ (U. S. E.).....	797.7 1634.9 1223.8	2.901833 3.213483 3.087693
Lake (U. S. E.) reference mark, ¹ 1913..	45 50 35.051 122 46 55.673	1082.2 1201.4	156 06 51	336 06 51	Lake (U. S. E.).....	30.90	1.48996
Eleven (U. S. E.), 1912.....	45 50 14.063 122 47 39.963	434.2 862.5	199 36 43.0 234 21 32.8	19 36 58.6 54 22 04.1	Warrior (U. S. E.)..... Lake (U. S. E.).....	1399.4 1160.6	3.145953 3.064682
Eleven (U. S. E.) reference mark, ¹ 1913..	45 50 13.184 122 47 40.584	407.1 875.9	206 17 08	26 17 08	Eleven (U. S. E.).....	30.27	1.48101
Ten (U. S. E.), 1912.....	45 50 10.868 122 47 01.531	335.5 33.0	96 47 05.0 165 45 43.5 188 21 39.8	276 46 37.5 345 45 31.6 8 21 43.6	Eleven (U. S. E.)..... Warrior (U. S. E.)..... Lake (U. S. E.).....	835.3 1461.8 783.2	2.921822 3.164878 2.893850
Ten (U. S. E.) reference mark, ¹ 1913..	45 50 10.683 122 46 59.663	329.8 1287.6	98 03 56	278 03 55	Ten (U. S. E.).....	40.72	1.60981
Nine (U. S. E.), 1912.....	45 49 27.206 122 47 51.394	840.0 1109.4	189 40 38.6 218 35 53.2	9 40 46.8 38 36 28.9	Eleven (U. S. E.)..... Ten (U. S. E.).....	1467.5 1725.0	3.166592 3.236779
Nine (U. S. E.) reference mark, ¹ 1913..	45 49 27.247 122 47 51.978	841.2 1122.0	275 45 28	95 45 28	Nine (U. S. E.).....	12.68	1.10312
Eight (U. S. E.), 1912.....	45 49 25.205 122 47 10.275	778.2 221.8	93 59 08.6 156 59 12.4	273 58 39.1 336 58 51.1	Nine (U. S. E.)..... Eleven (U. S. E.).....	889.8 1638.9	2.949280 3.214554
Seven 2 (U. S. E.), 1912.....	45 48 46.813 122 47 52.633	1445.3 1136.4	181 13 37.8 217 38 41.2	1 13 38.7 37 39 11.6	Nine (U. S. E.)..... Eight (U. S. E.).....	1217.4 1497.1	3.096002 3.175238
Seven 2 (U. S. E.) reference mark, ¹ 1913..	45 48 46.836 122 47 54.617	1446.0 1179.2	270 57 53	90 57 54	Seven 2 (U. S. E.).....	42.85	1.63195
Six (U. S. E.), 1912.....	45 48 46.325 122 47 02.969	1430.2 64.1	90 48 34.5 140 22 12.8	270 47 58.9 320 21 38.1	Seven 2 (U. S. E.)..... Nine (U. S. E.).....	1072.4 1638.9	3.030343 3.214552
Six (U. S. E.) reference mark, ¹ 1913..	45 48 46.470 122 47 02.151	1434.7 46.4	75 48 35	255 48 31	Six (U. S. E.).....	18.22	1.26055

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
Five 2 (U. S. E., 1912.....)	45 48 21.992 122 47 48.920	679.0 1056.4	174 01 39.6 232 51 46.9	354 01 36.9 52 52 19.8	Seven 2 (U. S. E.)..... Six (U. S. E.).....	<i>Meters.</i> 770.5 1244.5	2.886764 3.094989
Five 2 (U. S. E.) reference mark No. 1, ¹ 1913.	45 48 20.427 122 47 49.653	630.7 1072.2	198 08 43	18 08 44	Five 2 (U. S. E.).....	50.85	1.70629
Five 2 (U. S. E.) reference mark No. 2, ¹ 1913.	45 48 22.788 122 47 50.921	703.6 1099.6	299 38 13	119 38 14	Five 2 (U. S. E.).....	49.70	1.69636
Two (U. S. E.), 1912.....	45 47 53.365 122 46 37.876	1647.6 818.0	119 57 08.5 161 40 01.1	299 56 17.6 341 39 43.1	Five 2 (U. S. E.)..... Six (U. S. E.).....	1770.5 1722.5	3.248108 3.236161
One 2 (U. S. E.), 1912.....	45 47 55.744 122 47 41.360	1721.0 893.2	168 36 33.5 207 57 26.3 273 03 37.7	348 36 28.1 27 57 53.8 93 04 23.2	Five 2 (U. S. E.)..... Six (U. S. E.)..... Two (U. S. E.).....	826.6 1768.0 1373.0	2.917317 3.247478 3.137661
One 2 (U. S. E.) reference mark, ¹ 1913.	45 47 52.238 122 47 42.947	1612.8 927.5	197 33 57	17 33 58	One 2 (U. S. E.).....	113.54	2.055149
D (U. S. E.), 1912.....	45 47 20.454 122 47 15.471	631.5 334.2	152 50 08.4 213 37 29.7	332 49 49.9 38 37 56.7	One 2 (U. S. E.)..... Two (U. S. E.).....	1224.6 1300.7	3.088011 3.114165
D (U. S. E.) reference mark, ¹ 1913....	45 47 19.585 122 47 14.916	604.7 322.2	155 55 18	335 55 18	D. (U. S. E.).....	29.40	1.46835
A (U. S. E.), 1912.....	45 47 26.733 122 46 27.571	825.4 595.5	79 23 28.4 119 20 38.6 164 51 13.5	259 22 54.1 299 19 45.8 344 51 06.2	D (U. S. E.)..... One 2 (U. S. E.)..... Two (U. S. E.).....	1052.6 1828.1 851.8	3.022273 3.262003 2.930341
A (U. S. E.) reference mark, ¹ 1913....	45 47 27.581 122 46 25.337	851.5 547.3	61 31 47	241 31 45	A (U. S. E.).....	54.90	1.73757
E (U. S. E.), 1912.....	45 47 02.484 122 48 58.809	76.7 1270.4	147 01 38.2 222 01 29.2	327 01 26.3 42 01 51.6	D (U. S. E.)..... A (U. S. E.).....	661.3 1007.8	2.820397 3.003394
E (U. S. E.) reference mark, ¹ 1913....	45 47 01.203 122 46 59.958	37.1 1295.2	212 06 28	32 06 29	E (U. S. E.).....	46.70	1.66932
B (U. S. E.), 1912.....	45 47 10.104 122 46 16.258	312.0 351.2	75 38 49.7 104 01 52.4 154 32 42.8	255 38 19.2 284 01 10.0 334 32 34.7	E (U. S. E.)..... D (U. S. E.)..... A (U. S. E.).....	948.8 1318.3 568.6	2.977176 3.120209 2.754789
B (U. S. E.) reference mark, ¹ 1913....	45 47 10.288 122 46 14.719	317.6 317.9	80 19 21	216 19 20	B (U. S. E.).....	33.72	1.52789
Dead Willow (U. S. E.), 1912.....	45 46 39.013 122 46 36.423	1204.5 786.9	146 16 58.4 204 24 27.1	326 16 42.4 24 24 41.6	E (U. S. E.)..... B (U. S. E.).....	871.2 1054.1	2.940109 3.022886
Dead Willow (U. S. E.) reference mark, ¹ 1913.	45 46 38.448 122 46 37.440	1187.0 808.9	231 34 43	51 34 44	Dead Willow (U. S. E.).....	28.05	1.44793
C (U. S. E.), 1912.....	45 46 44.007 122 45 52.713	1358.7 1138.8	80 43 50.2 111 46 58.2 147 44 15.6	260 43 18.9 291 46 10.8 327 43 58.7	Dead Willow (U. S. E.)..... E (U. S. E.)..... B (U. S. E.).....	956.8 1537.6 952.8	2.980837 3.186845 2.979009
C (U. S. E.) reference mark, ¹ 1913....	45 46 44.161 122 45 51.790	1363.4 1118.9	76 35 54	256 35 53	C (U. S. E.).....	20.50	1.31175
Grassy (U. S. E.), 1912.....	45 46 22.546 122 46 21.246	696.1 459.0	147 10 40.7 222 55 53.4	327 10 29.8 42 56 13.8	Dead Willow (U. S. E.)..... C (U. S. E.).....	605.0 905.0	2.781734 2.956646
Grassy (U. S. E.) reference mark, ¹ 1913.	45 46 22.396 122 46 22.921	691.5 495.2	262 41 02	82 41 03	Grassy (U. S. E.).....	36.48	1.56205
Fales (U. S. E.), 1912.....	45 45 56.237 122 45 30.494	1736.3 658.9	126 31 54.3 161 58 15.9	306 31 18.0 341 58 00.0	Grassy (U. S. E.)..... C (U. S. E.).....	1364.7 1551.0	3.135033 3.190614
Fales (U. S. E.) reference mark, ¹ 1913.	45 45 56.167 122 45 28.256	1734.1 610.6	92 33 41	272 33 39	Fales (U. S. E.).....	48.42	1.68502
Ridge (U. S. E.), 1912.....	45 45 47.395 122 46 00.809	1463.3 17.5	157 51 29.2 185 42 48.4 247 22 34.3	337 51 14.6 5 42 54.2 67 22 56.0	Grassy (U. S. E.)..... C (U. S. E.)..... Fales (U. S. E.).....	1171.6 1756.5 709.7	3.068794 3.244655 2.851054
Ridge (U. S. E.) reference mark, ¹ 1913.	45 45 46.138 122 46 00.234	1424.5 5.1	162 14 07	342 14 07	Ridge (U. S. E.).....	40.74	1.61002
W 11 (U. S. E.), 1912.....	45 45 16.320 122 45 26.846	503.9 580.2	142 35 05.9 176 20 18.0	322 34 41.6 356 20 15.4	Ridge (U. S. E.)..... Fales (U. S. E.).....	1208.0 1234.9	3.082063 3.091628
W 16 (U. S. E.), 1912.....	45 45 15.702 122 46 02.137	481.8 46.2	181 40 43.6 208 39 00.9 268 34 00.4	1 40 44.6 28 39 23.6 88 34 25.7	Ridge (U. S. E.)..... Fales (U. S. E.)..... W 11 (U. S. E.).....	978.9 1426.0 763.0	2.990723 3.154133 2.882518
W 16 (U. S. E.) reference mark No. 1, ¹ 1913.	45 45 16.043 122 46 03.443	495.3 74.4	290 28 52	110 28 51	W 16 (U. S. E.).....	30.13	1.47900
W 16 (U. S. E.) reference mark No. 2, ¹ 1913.	45 45 16.228 122 46 04.147	501.0 89.6	290 28 52	110 28 51	W 16 (U. S. E.).....	46.37	1.66624
W 14 (U. S. E.), 1912.....	45 44 52.159 122 46 18.925	1610.4 409.1	206 31 38.6 236 27 55.5	26 31 50.6 56 28 32.8	W 16 (U. S. E.)..... W 11 (U. S. E.).....	812.4 1350.3	2.909760 3.130443

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
W 14 (U. S. E.) reference mark, ¹ 1913..	45 44 52.716 122 46 21.028	1627.6 454.5	290 42 57	110 42 58	W 14 (U. S. E.).....	48.60	1.68604
W 9 (U. S. E.), 1912.....	45 44 39.740 122 45 25.694	1227.1 555.4	108 25 31.2 144 38 34.7	288 24 53.1 324 38 08.6	W 14 (U. S. E.)..... W 16 (U. S. E.).....	1212.8 1361.2	3.083791 3.133912
W 9 (U. S. E.) reference mark, ¹ 1913..	45 44 39.894 122 45 24.820	1231.7 530.0	76 22 56	256 22 55	W 9 (U. S. E.).....	19.45	1.28892
W 12 ₂ (U. S. E.), 1912.....	45 44 21.122 122 46 32.832	652.1 709.8	197 25 02.6 248 22 55.7	17 25 12.6 68 23 43.8	W 14 (U. S. E.)..... W 9 (U. S. E.).....	1004.3 1561.1	3.001842 3.193440
W 7 ₂ (U. S. E.), 1912.....	45 44 10.952 122 45 13.315	338.1 287.9	100 21 32.0 131 53 49.6 163 14 50.9	280 20 35.1 311 53 02.7 343 14 42.1	W 12 ₂ (U. S. E.)..... W 14 (U. S. E.)..... W 9 (U. S. E.).....	1747.6 1905.3 928.4	3.242434 3.279966 2.967727
W 7 ₂ (U. S. E.) reference mark No. 1, ¹ 1913.	45 44 11.285 122 45 12.011	348.4 259.7	69 58 39	249 58 38	W 7 ₂ (U. S. E.).....	30.00	1.47712
W 7 ₂ (U. S. E.) reference mark No. 2, ¹ 1913.	45 44 11.617 122 45 10.708	358.7 231.5	69 58 40	249 58 38	W 7 ₂ (U. S. E.).....	60.00	1.77815
W 10 ₂ (U. S. E.), 1912.....	45 43 27.732 122 46 20.316	856.2 439.3	170 40 37.9 207 58 15.6 227 20 50.7	350 40 29.0 27 58 54.8 47 21 38.7	W 12 ₂ (U. S. E.)..... W 9 (U. S. E.)..... W 7 ₂ (U. S. E.).....	1670.4 2517.5 1969.6	3.222814 3.400964 3.294368
W 10 ₂ (U. S. E.) reference mark, ¹ 1913.	45 43 25.263 122 46 22.377	780.0 483.9	210 19 07	30 19 08	W 10 ₂ (U. S. E.).....	88.30	1.94596
W 5 ₂ (U. S. E.), 1912.....	45 43 02.055 122 45 26.747	63.4 578.5	124 23 15.2 187 46 26.5	304 22 36.8 7 46 36.1	W 10 ₂ (U. S. E.)..... W 7 ₂ (U. S. E.).....	1403.7 2146.6	3.147289 3.331782
W 5 ₂ (U. S. E.) reference mark, ¹ 1913..	45 43 01.859 122 45 25.092	57.4 542.7	99 35 30	279 35 29	W 5 ₂ (U. S. E.).....	36.30	1.55991
Range 2 (U. S. E.), 1913.....	45 43 36.398 122 45 14.495	1123.7 313.3	79 21 44.2 149 13 50.1 181 22 08.6	259 20 57.1 329 13 04.1 1 22 09.5	W 10 ₂ (U. S. E.)..... W 14 (U. S. E.)..... W 7 ₂ (U. S. E.).....	1443.3 2722.4 1067.1	3.160846 3.434946 3.028206
Range 2 (U. S. E.) reference mark, ¹ 1913.	45 43 36.552 122 45 11.498	1128.5 248.6	85 48 39	265 48 37	Range 2 (U. S. E.).....	64.97	1.81271
W 8 ₂ (U. S. E.), 1912.....	45 43 00.634 122 46 21.648	19.6 468.2	181 58 11.7 214 14 02.7 267 52 46.2	1 58 12.6 34 14 51.6 87 53 25.5	W 10 ₂ (U. S. E.)..... W 7 ₂ (U. S. E.)..... W 5 ₂ (U. S. E.).....	837.1 2626.0 1188.2	2.922755 3.419296 3.074876
W 6 (U. S. E.), 1912.....	45 42 34.127 122 46 15.612	1053.6 337.7	170 56 11.8 230 47 13.7	350 56 07.5 50 47 48.7	W 8 ₂ (U. S. E.)..... W 5 ₂ (U. S. E.).....	828.7 1364.0	2.918404 3.134804
W 6 (U. S. E.) reference mark, ¹ 1913..	45 42 35.177 122 46 16.739	1086.1 362.1	323 04 33	143 04 34	W 6 (U. S. E.).....	40.57	1.60820
W 3 (U. S. E.), 1912.....	45 41 51.660 122 45 35.926	1595.2 777.3	146 46 52.2 155 05 20.7 185 13 08.2	326 46 23.8 335 04 48.0 5 13 14.8	W 6 (U. S. E.)..... W 8 ₂ (U. S. E.)..... W 5 ₂ (U. S. E.).....	1567.0 2347.7 2182.1	3.195056 3.370641 3.338873
W 3 (U. S. E.) reference mark, ¹ 1913..	45 41 51.543 122 45 33.752	1591.3 730.2	94 43 22	274 43 20	W 3 (U. S. E.).....	47.20	1.67394
W 4 ₂ (U. S. E.), 1912.....	45 42 06.095 122 46 25.030	188.2 541.5	193 14 42.3 216 06 44.2 292 44 30.3	13 14 49.0 36 07 25.9 112 45 05.4	W 6 (U. S. E.)..... W 5 ₂ (U. S. E.)..... W 3 (U. S. E.).....	880.1 2138.7 1151.9	2.948944 3.330149 3.061422
W 4 ₂ (U. S. E.) reference mark, ¹ 1913..	45 42 05.291 122 46 26.421	163.4 571.6	230 27	50 27	W 4 ₂ (U. S. E.).....	39.00	1.59106
Brush ₂ (U. S. E.), 1913.....	45 42 37.551 122 45 28.237	1159.5 610.8	6 41 52.9 84 06 55.4	186 41 47.4 264 06 21.5	W 3 (U. S. E.)..... W 6 (U. S. E.).....	1426.3 1080.2	3.154201 3.012916
W 1 (U. S. E.), 1912.....	45 41 29.938 122 45 44.494	924.3 962.7	141 50 53.6 195 26 38.5	321 50 24.6 15 26 44.6	W 4 ₂ (U. S. E.)..... W 3 (U. S. E.).....	1419.6 696.0	3.152167 2.842621
W 2 ₂ (U. S. E.), 1912.....	45 41 26.444 122 46 38.026	816.4 822.8	192 56 02.0 239 53 49.9 264 40 27.4	12 56 11.3 59 54 34.3 84 41 05.7	W 4 ₂ (U. S. E.)..... W 3 (U. S. E.)..... W 1 (U. S. E.).....	1256.0 1553.0 1163.3	3.098998 3.191163 3.065698
W 2 ₂ (U. S. E.) reference mark, ¹ 1913..	45 41 28.546 122 46 41.098	881.3 889.3	314 18 29	134 18 31	W 2 ₂ (U. S. E.).....	92.90	1.96802
Jewetts (U. S. E.), 1913.....	45 40 54.049 122 46 43.009	1668.0 930.8	186 09 08.5 228 48 22.3	6 09 12.1 48 49 04.2	W 2 ₂ (U. S. E.)..... W 1 (U. S. E.).....	1005.9 1682.6	3.002575 3.225971
Hewletts 2 (U. S. E.), 1913.....	45 40 53.313 122 45 59.351	1645.9 1284.4	340 35 32.1 24 23 52.0 91 22 48.2 140 42 44.1	160 35 42.1 204 23 33.7 271 22 16.9 320 42 16.4	One 3 (U. S. E.)..... Two 2 (U. S. E.)..... Jewetts (U. S. E.)..... W 2 ₂ (U. S. E.).....	913.6 1336.8 945.1 1321.6	2.960769 3.126056 2.975480 3.121105
Morgans 2 (U. S. E.), 1913.....	45 40 38.515 122 46 36.547	1189.1 790.9	163 44 22.1 215 21 03.4 240 25 10.9 290 03 23.1 341 36 14.7	343 44 17.5 35 21 40.7 60 25 37.6 110 03 59.8 161 36 23.1	Jewetts (U. S. E.)..... W 1 (U. S. E.)..... Hewletts (U. S. E.)..... One 3 (U. S. E.)..... Two 2 (U. S. E.).....	499.5 1946.6 925.6 1180.2 801.5	2.698563 3.289271 2.966424 3.071968 2.903908

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Morgans 2 (U. S. E.) reference mark, ¹ 1913.	45 40 38.661 122 46 38.160	1193.6 825.9	277 22 13	97 22 14	Morgans 2 (U. S. E.)	Meters. 35.21	1.54667
One 3 (U. S. E.), 1912.....	45 40 25.402 122 45 45.325	784.2 981.0	148 49 22.5 180 30 58.7	328 48 44.8 0 30 59.3	W 2 _s (U. S. E.) W 1 (U. S. E.)	2202.8 1992.5	3.342977 3.299399
One 3 (U. S. E.) reference mark, ¹ 1913..	45 40 25.627 122 45 43.917	791.2 950.5	77 08 13	257 08 12	One 3 (U. S. E.)	31.26	1.49499
Two 2 (U. S. E.), 1912.....	45 40 13.830 122 46 24.862	428.5 538.2	172 45 09.9 200 24 09.9 247 25 31.8	352 45 00.5 20 24 38.8 67 26 00.1	W 2 _s (U. S. E.) W 1 (U. S. E.) One 3 (U. S. E.)	2258.3 2505.4 926.7	3.353783 3.398370 2.966957
Two 2 (U. S. E.) reference mark, ¹ 1913.	45 40 14.232 122 46 27.379	439.4 592.6	281 16 30	101 16 32	Two 2 (U. S. E.)	55.55	1.74468
Middle, 1913.....	45 40 03.780 122 45 29.891	116.7 647.0	104 41 23.7 153 24 49.1	284 40 44.4 333 24 38.1	Two 2 (U. S. E.) One 3 (U. S. E.)	1230.1 746.5	3.089936 2.873008
Middle reference mark, ¹ 1913.....	45 40 01.120 122 45 27.689	34.6 599.4	149 52 30	329 52 28	Middle	94.95	1.97750
Four 2 (U. S. E.), 1912.....	45 39 28.845 122 45 59.314	690.5 1284.1	158 18 34.9 189 50 11.6 210 33 43.0	338 18 16.6 9 50 21.6 30 34 04.0	Two 2 (U. S. E.) One 3 (U. S. E.) Middle	1496.3 1772.1 1252.6	3.175023 3.248489 3.097799
Four 2 (U. S. E.) reference mark, ¹ 1913.	45 39 28.890 122 46 00.696	891.9 15.1	272 39 56	92 39 57	Four 2 (U. S. E.)	29.96	1.47654
Mud, 1913.....	45 38 50.358 122 45 57.410	1554.7 1243.2	178 00 44.3 194 43 23.7 67 30 05.3	358 00 43.0 14 43 43.4 247 29 31.4	Four 2 (U. S. E.) Middle Howell	1188.9 2343.7 1112.4	3.075154 3.369907 3.046277
Mud reference mark, No. 1, ¹ 1913.....	45 38 50.402 122 45 56.033	1556.1 1213.3	87 24 06	267 24 05	Mud	29.85	1.47494
Mud reference mark, No. 2, ¹ 1913.....	45 38 50.414 122 45 55.660	1556.4 1205.2	87 24 06	267 24 05	Mud	37.94	1.57910
School, 1913.....	45 39 01.251 122 46 18.651	38.6 403.7	206 10 09.3 306 10 24.3 36 41 20.3	26 10 23.1 126 10 39.4 216 41 01.5	Four 2 (U. S. E.) Mud Howell	949.2 569.8 950.3	2.977358 2.755707 2.977876
School reference mark, ¹ 1913.....	45 39 02.910 122 46 19.164	89.8 415.0	347 45 08	167 45 08	School	52.4	1.71933
Three 3 (U. S. E.), 1912.....	45 39 49.186 122 45 19.498	1518.5 422.1	40 52 42.1 53 55 44.4 118 19 17.9 153 26 05.3	220 51 59.8 233 55 15.9 298 18 31.1 333 25 46.8	School Four 2 (U. S. E.) Two 2 (U. S. E.) One 3 (U. S. E.)	1957.1 1066.5 1607.2 1250.1	3.291609 3.027955 3.206083 3.096928
Three 3 (U. S. E.) reference mark, ¹ 1913.	45 39 49.858 122 45 17.065	1539.3 369.4	68 30 42	248 30 40	Three 3 (U. S. E.)	56.60	1.75282
End, 1913.....	45 39 02.732 122 46 02.391	1010.4 51.8	192 47 50.5 241 18 53.5 330 57 37.1 19 54 42.2	12 48 02.7 61 19 24.2 150 57 39.3 199 54 30.6	One 3 (U. S. E.) Three 3 (U. S. E.) Four 2 (U. S. E.) School	1667.5 1058.5 137.3 1033.7	3.222059 3.024677 2.137536 3.014385
End reference mark, ¹ 1913.....	45 39 30.314 122 46 02.596	935.9 56.2	183 24 07	3 24 07	End	74.78	1.87379
Pen, 1913.....	45 38 20.005 122 46 25.174	617.6 545.2	140 09 48.6 186 19 43.1 212 40 54.7	320 09 34.5 6 19 47.8 32 41 14.5	Howell School Mud	665.9 1281.2 1113.4	2.823387 3.107612 3.046632
Pen reference mark, ¹ 1913.....	45 38 18.725 122 46 28.711	578.1 621.8	242 43 00	62 43 02	Pen	86.2	1.93551
Linton, 1913.....	45 36 02.300 122 47 19.807	71.0 429.2	189 01 34.1 195 33 07.9 233 57 10.0	9 01 59.1 15 33 47.0 53 58 07.0	Howell Pen Gatton	4822.5 4413.1 2136.9	3.683269 3.644744 3.329794
Linton reference mark, ¹ 1913.....	45 36 01.888 122 47 19.801	58.3 429.1	179 25 54	359 25 54	Linton	12.72	1.10449
Sand, 1913.....	45 37 23.351 122 47 14.124	875.3 306.0	196 44 27.7 311 05 17.8 2 39 17.4	16 44 48.6 311 06 10.7 182 39 12.8	Howell Gatton Linton	2199.3 2129.0 2659.5	3.342278 3.328178 3.424805
Sand reference mark, ¹ 1913.....	45 37 27.643 122 47 12.967	853.4 280.9	131 05 19	311 05 18	Sand	33.25	1.52179
Howell, 1881.....	45 38 36.566 122 46 44.871	1128.9 971.7	15 31 31.9 133 46 01.1	195 30 53.1 313 41 50.6	Willamet Bouser	4391.1 10486.3	3.642575 4.020622
Howell reference mark No. 1, ¹ 1913...	45 38 37.445 122 46 42.851	1153.0 928.0	58 11 13	238 11 12	Howell	51.49	1.71172
Howell reference mark No. 2, ¹ 1913...	45 38 40.620 122 46 43.856	1254.1 949.7	9 57 33	189 57 32	Howell	127.10	2.10415

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Gatton, 1883.....	45 36 43.022 122 46 00.069	1328.2 1.5	71 19 51.6 164 31 45.5	251 18 40.8 344 31 13.5	Willamet..... Howell.....	Meters. 2265.5 3637.3	3.355156 3.560782
Gatton reference mark No. 1, ¹ 1913...	45 36 44.796 122 45 59.981	1383.0 1299.6	2 00 19	182 00 19	Gatton.....	54.80	1.73878
Gatton reference mark No. 2, ¹ 1913...	45 36 42.856 122 46 00.378	1323.1 8.2	232 37 34	52 37 34	Gatton.....	8.42	0.92531
Springville, 1883.....	45 35 04.047 122 46 10.000	125.0 216.8	140 21 15.0 184 01 43.0	320 20 11.3 4 01 50.1	Willamet..... Gatton.....	3026.5 3063.2	3.480941 3.486180
Watts, 1883.....	45 35 39.329 122 46 48.337	1214.2 1047.7	208 00 22.2 322 39 19.9	28 00 56.7 142 39 47.3	Gatton..... Springville.....	2227.3 1370.0	3.347784 3.136736
Kaiser, 1883.....	45 36 16.003 122 47 22.059	494.0 478.0	244 50 30.5 324 54 00.4	64 51 29.4 144 53 51.9	Gatton..... Springville.....	1962.8 2715.6	3.292867 3.433865
St. John, 1883.....	45 35 22.221 122 45 52.516	686.0 1138.4	34 02 34.2 113 35 16.1 130 33 29.2	214 02 21.7 293 34 36.2 310 32 25.1	Springville..... Watts..... Kaiser.....	677.1 1320.2 2554.1	2.830654 3.120648 3.407241
Caples, 1883.....	45 34 56.731 122 44 50.999	1751.5 1105.7	97 31 15.6 120 33 04.6	277 30 19.2 300 32 20.7	Springville..... St. John.....	1727.5 1548.5	3.237423 3.189898
Caples reference mark, ¹ 1913.....	45 34 57.634 122 44 49.827	1779.3 1080.2	42 20 52	222 20 51	Caples.....	37.72	1.57657
Hazel, 1883.....	45 34 36.082 122 45 34.938	1113.9 757.6	165 01 26.9 236 12 18.2	345 01 14.4 56 12 49.6	St. John..... Caples.....	1474.5 1146.2	3.168657 3.059278
Waud, 1882.....	45 34 19.484 122 43 49.738	601.5 1078.5	102 40 18.4 130 53 25.5 339 02 22.4	282 39 03.3 310 52 41.8 159 03 18.8	Hazel..... Caples..... Balch.....	2337.9 1756.9 4790.6	3.368820 3.244738 3.680388
Scott, 1882.....	45 33 23.862 122 44 07.186	736.7 155.8	161 40 15.8 192 25 29.6	341 39 44.5 12 25 42.0	Caples..... Waud.....	3020.5 1758.4	3.480073 3.245123
Scott reference mark, ¹ 1913.....	45 33 23.337 122 44 07.668	720.5 166.3	212 49 44	32 49 44	Scott.....	19.28	1.28511
Gravel Bluff, 1882.....	45 33 12.226 122 41 26.035	377.4 564.6	95 53 01.3 123 41 20.4 30 21 55.5	275 51 06.3 303 39 37.8 210 21 09.3	Scott..... Waud..... Balch.....	3513.8 3744.9 2778.3	3.545773 3.573437 3.443786
Potter, 1883.....	45 33 01.778 122 43 39.658	54.9 860.3	174 47 38.7 263 38 10.0 324 13 23.8	354 47 31.6 83 39 45.4 144 14 13.0	Waud..... Gravel Bluff..... Balch.....	2409.0 2916.3 2557.1	3.381832 3.464835 3.407753
Montgomery, 1882.....	45 32 13.180 122 40 23.196	406.9 503.3	78 17 17.9 109 24 44.8 143 12 56.6	258 15 46.9 289 22 24.6 323 12 11.8	Balch..... Potter..... Gravel Bluff.....	2826.9 4518.5 2276.3	3.451313 3.654993 3.357228
King, 1883.....	45 31 34.049 122 42 06.683	1052.2 145.0	156 22 17.4 196 13 06.1 241 42 36.5	336 21 04.0 16 13 35.1 61 43 50.3	Waud..... Gravel Bluff..... Montgomery.....	5575.3 3156.7 2549.9	3.746266 3.499233 3.406528
Tibbets, 1882.....	45 29 56.151 122 39 32.251	1733.5 700.2	132 03 12.7 165 21 26.2	312 01 22.5 345 20 49.8	King..... Montgomery.....	4513.5 4372.6	3.654513 3.640735
Hoffmans Hill, 1883.....	45 30 23.710 122 41 09.420	732.0 204.5	196 31 41.2 291 57 18.2	16 32 14.2 111 58 27.5	Montgomery..... Tibbets.....	3525.4 2274.6	3.547207 3.356914
Forty (U. S. E.), 1913.....	45 33 46.496 122 43 59.967	1435.4 1300.6	12 37 41.2 152 58 09.5	192 37 36.1 332 57 33.1	Scott..... Caples.....	716.1 2434.4	2.854990 3.386385
Forty (U. S. E.) reference mark, ¹ 1913.	45 33 45.367 122 44 00.380	1400.6 8.2	194 25 13	14 25 13	Forty (U. S. E.).....	36.0	1.55630
R (U. S. E.), 1913.....	45 34 05.763 122 43 35.510	177.9 770.1	27 58 22.2 41 43 29.5 133 52 44.6	207 57 59.6 221 43 12.0 313 51 50.7	Scott..... Forty (U. S. E.)..... Caples.....	1464.7 796.9 2270.5	3.165749 2.901422 3.356114
R (U. S. E.) reference mark, ¹ 1913....	45 34 04.490 122 43 36.473	138.6 791.0	207 58 21	27 58 22	R (U. S. E.).....	44.51	1.64846
Thirty-nine 2 (U. S. E.), 1913.....	45 34 20.740 122 43 50.181	640.3 1088.1	325 28 14.1 11 21 03.6	145 28 24.6 191 20 56.6	R (U. S. E.)..... Forty (U. S. E.).....	561.3 1078.3	2.749167 3.032740
Thirty-eight 2 (U. S. E.), 1913.....	45 34 30.209 122 44 53.935	932.6 1169.5	281 56 03.0 319 03 50.7	101 56 48.5 139 04 29.2	Thirty-nine 2 (U. S. E.)..... Forty (U. S. E.).....	1412.9 1786.3	3.150121 3.251950
Dike (U. S. E.), 1913.....	45 34 42.140 122 44 07.088	1301.0 153.7	330 58 29.2 70 04 19.9	150 58 41.3 250 03 46.5	Thirty nine 2 (U. S. E.)..... Thirty-eight 2 (U. S. E.).....	755.5 1080.4	2.878262 3.033604
Thirty-seven (U. S. E.), 1913.....	45 34 56.780 122 44 56.755	1752.9 1230.4	292 45 51.4 355 44 11.1	112 46 26.8 175 44 13.1	Diko (U. S. E.)..... Thirty-eight 2 (U. S. E.).....	1167.8 822.6	3.067373 2.915179
Thirty-nine (U. S. E.), 1913.....	45 34 19.092 122 43 51.540	580.4 1117.6	10 17 38.2 129 27 24.8 132 02 12.8	190 17 32.1 309 26 38.2 312 01 30.3	Forty (U. S. E.)..... Thirty-seven (U. S. E.)..... Caples.....	1022.8 1831.2 1735.6	3.009779 3.262727 3.239446

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Thirty-eight (U. S. E.), 1913.....	45 34 22.085 122 44 44.151	681.8 957.3	165 41 18.2 172 05 52.7 274 37 30.9 318 54 20.6	345 41 09.2 352 05 47.8 94 38 08.5 138 54 52.1	Thirty seven (U. S. E.)..... Caples..... Thirty-nine (U. S. E.)..... Forty (U. S. E.).....	Meters. 1105.5 1079.9 1144.5 1457.8	3.048541 3.033380 3.058623 3.163696
Forty-one (U. S. E.), 1899.....	45 33 41.432 122 43 09.531	1279.1 206.7	98 08 24.8 141 55 29.0	278 07 48.8 321 54 59.0	Forty (U. S. E.)..... Thirty-nine (U. S. E.).....	1104.9 1477.1	3.043339 3.169397
Forty-two (U. S. E.), 1892.....	45 33 20.099 122 43 16.654	620.5 361.2	130 56 52.8 193 12 03.1	310 56 21.9 13 12 08.2	Forty (U. S. E.)..... Forty-one (U. S. E.).....	1243.6 676.5	3.094693 2.830263
Forty-three (U. S. E.), 1906.....	45 33 31.125 122 42 40.376	960.9 873.7	66 36 34.0 116 42 53.2	246 36 08.1 296 42 37.4	Forty-two (U. S. E.)..... Forty-one (U. S. E.).....	857.3 707.9	2.933148 2.849956
Forty-four (U. S. E.), 1909.....	45 33 07.053 122 42 37.639	217.7 816.5	115 27 16.7 124 18 02.5 175 25 57.2	295 26 48.8 304 17 03.7 355 25 55.2	Forty-two (U. S. E.)..... Forty (U. S. E.)..... Forty-three (U. S. E.).....	937.2 2161.3 745.5	2.971845 3.334722 2.872467
Forty-four (U. S. E.) reference mark, ¹ 1913.....	45 33 06.511 122 42 37.260	201.0 808.3	153 50 51	333 50 51	Forty-four (U. S. E.).....	18.64	1.27045
F (U. S. E.), 1909.....	45 33 55.057 122 42 53.972	1699.7 1170.4	346 33 20.5 79 32 42.5 110 09 17.0	166 33 32.1 259 31 55.3 290 08 47.2	Forty-four (U. S. E.)..... Forty (U. S. E.)..... R (U. S. E.).....	1523.7 1455.4 959.5	3.182913 3.162989 2.982058
T (U. S. E.), 1909.....	45 34 29.906 122 42 20.024	923.3 434.2	34 23 02.5 65 31 30.5	214 22 38.3 245 30 36.6	F (U. S. E.)..... R (U. S. E.).....	1303.6 1798.6	3.115153 3.254923
T (U. S. E.) reference mark, ¹ 1913.....	45 34 31.673 122 42 22.373	977.8 485.1	316 58 18	136 58 20	T (U. S. E.).....	74.64	1.87297
P (U. S. E.), 1909.....	45 33 45.011 122 41 49.207	1389.6 1067.2	41 52 42.7 102 27 33.2 154 15 46.7	221 52 08.1 282 26 47.0 334 15 24.7	Forty-four (U. S. E.)..... F (U. S. E.)..... T (U. S. E.).....	1573.7 1438.4 1538.7	3.196935 3.157873 3.187164
P (U. S. E.) reference mark, ¹ 1913.....	45 33 45.935 122 41 50.400	1418.2 1093.0	317 47 07	137 47 08	P (U. S. E.).....	38.5	1.58546
W (U. S. E.), 1909.....	45 33 28.001 122 41 36.350	864.5 788.4	10 28 52.7 64 03 50.5 116 23 51.7	190 28 49.5 244 03 06.7 296 22 56.3	Forty-five (U. S. E.)..... Forty-four (U. S. E.)..... F (U. S. E.).....	531.2 1478.3 1879.3	2.725354 3.169770 3.273987
Thirty-six (U. S. E.), 1899.....	45 34 45.855 122 45 21.218	1415.7 460.1	237 32 34.9 242 51 41.5 309 13 52.2 312 23 45.7	57 32 52.4 62 52 03.2 129 14 11.7 132 24 12.2	Thirty-seven (U. S. E.)..... Caples..... Thirty-eight 2 (U. S. E.)..... Thirty-eight (U. S. E.).....	628.5 736.2 763.7 1088.3	2.798314 2.866988 2.882920 3.036762
Forty-five (U. S. E.), 1906.....	45 33 11.078 122 41 40.806	342.0 885.1	84 14 59.6 115 36 02.4	264 14 19.0 295 35 19.9	Forty-four (U. S. E.)..... Forty-three (U. S. E.).....	1239.0 1432.6	3.093075 3.156139
Forty-five 2 (U. S. E.), 1906.....	45 33 12.419 122 41 42.227	383.4 915.9	82 09 33 171 26 39	262 08 53 351 26 34	Forty-four (U. S. E.)..... P (U. S. E.).....	1213.3 1017.5	3.083974 3.007546
Forty-six 2 (U. S. E.), 1906.....	45 32 51.294 122 41 55.559	1583.6 1205.3	118 03 45 203 54 45	298 03 15 23 54 55	Forty-four (U. S. E.)..... Forty-five 2 (U. S. E.).....	1034.4 713.4	3.014684 2.853352
Forty-seven (U. S. E.), 1906.....	45 32 52.413 122 41 28.135	1618.1 610.3	86 40 50 153 40 13	266 40 30 333 40 03	Forty-six 2 (U. S. E.)..... Forty-five 2 (U. S. E.).....	595.9 689.2	2.775182 2.838318
Forty-eight 2 (U. S. E.), 1906.....	45 32 32.752 122 41 28.800	1011.1 624.8	134 36 08 181 21 38	314 35 49 1 21 39	Forty-six 2 (U. S. E.)..... Forty-seven (U. S. E.).....	815.3 607.2	2.911319 2.783310
Forty-nine 2 (U. S. E.), 1906.....	45 32 34.823 122 41 07.588	1075.1 164.6	82 05 26 140 37 20	262 05 11 320 37 06	Forty-eight 2 (U. S. E.)..... Forty-seven 2 (U. S. E.).....	464.6 702.6	2.667084 2.846683
Fifty 2 (U. S. E.), 1906.....	45 32 24.967 122 41 15.540	770.8 337.1	129 52 35 209 33 03	309 52 26 29 33 09	Forty-eight 2 (U. S. E.)..... Forty-nine 2 (U. S. E.).....	374.9 349.8	2.573863 2.543793
Fifty-one 2 (U. S. E.), 1906.....	45 32 24.138 122 40 54.935	745.2 1191.8	93 16 39 140 14 03	273 16 24 320 13 54	Fifty 2 (U. S. E.)..... Forty-nine 2 (U. S. E.).....	447.8 429.1	2.651049 2.632600
Fifty-two 2 (U. S. E.), 1906.....	45 32 15.406 122 41 01.459	475.6 31.7	134 00 58 207 41 51	314 00 48 27 41 56	Fifty 2 (U. S. E.)..... Fifty-one 2 (U. S. E.).....	424.8 304.5	2.628201 2.483572
Fifty-three 2 (U. S. E.), 1906.....	45 32 15.914 122 40 38.696	491.3 839.6	88 10 57 125 46 49	268 10 41 305 46 38	Fifty-two 2 (U. S. E.)..... Fifty-one 2 (U. S. E.).....	494.1 434.3	2.693830 2.637774
Fifty-four 2 (U. S. E.), 1906.....	45 32 04.249 122 41 44.065	131.2 956.1	132 23 13 197 55 26	312 23 01 17 55 30	Fifty-two 2 (U. S. E.)..... Fifty-three 2 (U. S. E.).....	510.9 378.5	2.708371 2.578059
Fifty-five 2 (U. S. E.), 1906.....	45 32 08.191 122 41 27.885	252.9 605.0	70 52 52 135 27 58	250 52 40 215 27 50	Fifty-four 2 (U. S. E.)..... Fifty-three 2 (U. S. E.).....	371.6 334.5	2.570039 2.524349
Fifty-six 2 (U. S. E.), 1906.....	45 31 55.578 122 41 30.791	1715.8 608.1	132 54 25 189 11 57	312 54 15 9 11 50	Fifty-four 2 (U. S. E.)..... Fifty-five 2 (U. S. E.).....	393.2 394.5	2.594621 2.596020
Fifty-seven 2 (U. S. E.), 1906.....	45 31 55.634 122 41 15.170	1717.6 329.2	89 42 35 144 33 49	269 42 24 324 33 40	Fifty-six 2 (U. S. E.)..... Fifty-five 2 (U. S. E.).....	339.0 475.8	2.530161 2.677445
Fifty-eight 2 (U. S. E.), 1906.....	45 31 47.324 122 41 19.108	1461.0 414.6	135 08 54 198 25 25	315 08 46 18 25 28	Fifty-six 2 (U. S. E.)..... Fifty-seven 2 (U. S. E.).....	359.4 270.4	2.555633 2.432012

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
	° ' "		° ' "	° ' "		Meters.	
Fifty-nine 2 (U. S. E.), 1906.....	45 31 49.038 122 41 08.286	1513.9 179.8	77 18 16 143 44 22	257 18 08 323 44 17	Fifty-eight 2 (U. S. E.)..... Fifty-seven 2 (U. S. E.).....	240.7 252.5	2.381520 2.402341
Union Depot, Portland (U. S. E.), 1906.	45 31 45.731 122 41 32.741	1411.8 710.5	188 38 27 231 16 32 259 06 33	8 38 31 51 16 45 79 06 51	Fifty-five 2 (U. S. E.)..... Fifty-seven 2 (U. S. E.)..... Fifty-nine 2 (U. S. E.).....	701.4 488.7 540.4	2.845935 2.689053 2.732713
Thirty-five (U. S. E.), 1899.....	45 35 05.086 122 45 27.290	157.0 591.6	291 10 17.1 347 29 45.1	111 10 38.9 167 29 49.4	Thirty-seven (U. S. E.)..... Thirty-six (U. S. E.).....	709.9 608.1	2.851203 2.783995
Thirty-four (U. S. E.), 1899.....	45 34 53.801 122 45 43.171	1661.0 935.9	224 39 23.7 297 15 49.7	44 39 35.1 117 16 05.4	Thirty-five (U. S. E.)..... Thirty-six (U. S. E.).....	489.8 535.4	2.690024 2.728716
Thirty-three (U. S. E.), 1899.....	45 35 16.168 122 45 44.715	499.2 969.4	312 10 03.0 357 13 29.6	132 10 16.1 177 13 30.7	Thirty-five (U. S. E.)..... Thirty-four (U. S. E.).....	509.6 691.3	2.707260 2.839696
Thirty-two (U. S. E.), 1899.....	45 35 09.052 122 45 04.601	279.5 99.7	242 59 37.4 315 22 52.4	62 59 51.6 135 23 07.7	Thirty-three (U. S. E.)..... Thirty-four (U. S. E.).....	483.8 661.5	2.684704 2.820505
Thirty (U. S. E.), 1899.....	45 35 21.548 122 46 18.815	665.3 407.9	282 39 39.2 321 23 07.2	102 40 03.6 141 23 17.4	Thirty-three (U. S. E.)..... Thirty-two (U. S. E.).....	757.6 493.7	2.879453 2.693493
Thirty-one (U. S. E.), 1899.....	45 35 31.622 122 45 59.637	976.3 1292.7	53 11 57.9 325 51 50.9	233 11 44.2 145 52 01.6	Thirty (U. S. E.)..... Thirty-three (U. S. E.).....	519.2 576.4	2.715322 2.760744
Twenty-nine (U. S. E.), 1899.....	45 35 51.097 122 46 16.172	1596.0 350.4	3 31 19.1 329 57 33.1	183 31 17.2 149 57 44.9	Thirty (U. S. E.)..... Thirty-one (U. S. E.).....	932.6 716.0	2.969682 2.854884
Twenty-eight (U. S. E.), 1899.....	45 35 36.260 122 46 36.154	1119.5 783.6	222 15 39.8 320 23 30.8	42 15 54.1 152 23 43.2	Twenty-nine (U. S. E.)..... Thirty (U. S. E.).....	644.0 589.6	2.808876 2.770526
Twenty-six (U. S. E.), 1899.....	45 36 07.936 122 47 03.244	245.0 70.3	296 09 58.5 329 01 04.5	116 10 32.1 149 01 23.8	Twenty-nine (U. S. E.)..... Twenty-eight (U. S. E.).....	1136.7 1140.6	3.055647 3.057151
Twenty-seven (U. S. E.), 1899.....	45 36 20.299 122 46 26.189	626.7 567.5	64 34 49.0 346 11 13.0	244 34 22.5 166 11 20.1	Twenty-six (U. S. E.)..... Twenty-nine (U. S. E.).....	889.1 909.3	2.948959 2.958726
Twenty-five (U. S. E.), 1899.....	45 36 32.268 122 46 39.682	996.2 859.9	34 12 22.3 321 38 43.3	214 12 05.5 141 38 53.0	Twenty-six (U. S. E.)..... Twenty-seven (U. S. E.).....	908.3 471.2	2.958235 2.673204
Twenty-four (U. S. E.), 1899.....	45 36 36.409 122 47 19.468	1124.1 421.8	278 25 54.9 318 11 56.9	98 26 23.3 158 12 08.5	Twenty-five (U. S. E.)..... Twenty-six (U. S. E.).....	871.6 946.8	2.940298 2.976247
Twenty-three (U. S. E.), 1899.....	45 37 00.572 122 47 02.964	17.7 64.2	25 36 48.7 329 59 58.7	205 36 36.9 150 00 15.3	Twenty-four (U. S. E.)..... Twenty-five (U. S. E.).....	827.3 1003.0	2.917644 3.003893
Twenty-two (U. S. E.), 1899.....	45 37 06.548 122 47 36.808	202.2 797.5	284 07 12.5 338 00 37.5	104 07 36.7 158 00 49.9	Twenty-three (U. S. E.)..... Twenty-four (U. S. E.).....	756.1 1003.5	2.878591 3.001505
Twenty-one (U. S. E.), 1899.....	45 37 22.678 122 47 14.360	700.1 311.1	44 19 24.5 340 06 38.5	224 19 08.5 160 06 46.7	Twenty-two (U. S. E.)..... Twenty-three (U. S. E.).....	696.1 725.8	2.842651 2.860805
Twenty (U. S. E.), 1899.....	45 37 33.741 122 47 37.747	1041.7 817.6	363 59 04.8 358 36 43.8	123 59 21.5 178 36 44.5	Twenty-one (U. S. E.)..... Twenty-two (U. S. E.).....	611.0 839.8	2.786053 2.924174
Nineteen (U. S. E.), 1899.....	45 37 54.229 122 47 03.661	1674.2 79.3	13 23 06.2 49 25 04.2	193 22 58.5 229 24 39.8	Twenty-one (U. S. E.)..... Twenty (U. S. E.).....	1001.3 972.2	3.000558 2.987778
Eighteen (U. S. E.), 1899.....	45 38 07.826 122 47 28.027	241.6 607.1	11 18 56.8 308 29 48.8	191 18 49.8 128 30 06.2	Twenty (U. S. E.)..... Nineteen (U. S. E.).....	1073.2 674.3	3.030669 2.828883
Seventeen (U. S. E.), 1899.....	45 38 05.135 122 46 55.402	158.5 1200.0	27 58 53.1 96 42 28.1	207 58 47.2 276 42 04.8	Nineteen (U. S. E.)..... Eighteen (U. S. E.).....	381.3 711.5	2.581253 2.852168
Sixteen (U. S. E.), 1899.....	45 38 21.072 122 47 11.230	650.6 243.2	41 39 25.8 325 07 59.8	221 39 13.8 145 08 11.1	Eighteen (U. S. E.)..... Seventeen (U. S. E.).....	547.4 599.7	2.738270 2.777909
Fifteen (U. S. E.), 1899.....	45 38 13.179 122 46 47.648	406.9 1032.0	34 04 23.6 115 30 33.6	214 04 18.1 295 30 16.8	Seventeen (U. S. E.)..... Sixteen (U. S. E.).....	299.8 565.9	2.476835 2.752741
Fourteen (U. S. E.), 1899.....	45 38 27.611 122 46 56.483	852.4 1223.3	57 42 22.3 336 45 25.3	237 42 11.8 156 45 31.6	Sixteen (U. S. E.)..... Fifteen (U. S. E.).....	377.8 484.9	2.577290 2.685658
Thirteen (U. S. E.), 1899.....	45 38 19.118 122 46 39.756	590.2 861.0	42 59 33.3 125 53 55.3	222 59 27.6 305 53 43.3	Fifteen (U. S. E.)..... Fourteen (U. S. E.).....	250.7 447.2	2.399085 2.650505
Twelve (U. S. E.), 1899.....	45 38 35.460 122 46 39.908	1094.8 864.3	55 58 41.2 359 37 33.3	235 58 29.3 179 37 33.3	Fourteen (U. S. E.)..... Thirteen (U. S. E.).....	433.1 504.6	2.636590 2.702908
Eleven (U. S. E.), 1899.....	45 38 25.829 122 46 28.837	797.4 624.6	48 46 36.1 141 07 07.1	228 46 28.3 321 06 59.2	Thirteen (U. S. E.)..... Twelve (U. S. E.).....	314.4 382.0	2.497511 2.582027
Ten (U. S. E.), 1899.....	45 38 43.907 122 46 27.202	1355.5 589.1	3 37 46.3 46 32 13.3	183 37 45.1 226 32 04.2	Eleven (U. S. E.)..... Twelve (U. S. E.).....	559.3 379.1	2.747607 2.578768
Nine (U. S. E.), 1899.....	45 38 40.253 122 46 02.645	1242.7 57.3	51 52 00.8 101 58 38.8	231 51 42.1 281 58 21.3	Eleven (U. S. E.)..... Ten (U. S. E.).....	721.2 543.6	2.858030 2.735305
Eight (U. S. E.), 1899.....	45 38 53.192 122 46 17.315	1642.2 374.9	36 45 20.3 321 30 18.3	216 45 13.3 141 30 28.8	Ten (U. S. E.)..... Nine (U. S. E.).....	357.8 510.4	2.553648 2.707903
Six (U. S. E.), 1899.....	45 39 06.726 122 46 07.085	207.7 153.4	27 55 57.6 353 17 27.6	207 55 50.3 173 17 30.8	Eight (U. S. E.)..... Nine (U. S. E.).....	472.9 822.9	2.674794 2.915369

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Seven (U. S. E.), 1899.....	45 39 03.471 122 45 42.518	107.2 920.6	31 18 11.2 100 42 04.2 155 06 04.2	211 17 56.8 280 41 46.6 335 05 52.2	Nine (U. S. E.)..... Six (U. S. E.)..... Four 2 (U. S. E.).....	<i>Meters.</i> 838.9 541.4 863.8	2.923716 2.733483 2.936394
Four (U. S. E.), 1899.....	45 39 24.957 122 45 53.618	770.5 1160.8	27 23 12.2 340 04 59.3	207 23 02.6 160 05 07.2	Six (U. S. E.)..... Seven (U. S. E.).....	633.9 705.6	2.802023 2.848534
Five (U. S. E.), 1899.....	45 39 27.181 122 45 09.260	839.2 200.5	44 31 58.0 85 54 54.0 92 43 21.0	224 31 34.2 265 54 22.3 272 42 45.2	Seven (U. S. E.)..... Four (U. S. E.)..... Four 2 (U. S. E.).....	1026.8 962.8 1084.9	3.011505 2.983555 3.035405
Thirty-five 2 (U. S. E.), 1913.....	45 35 06.359 122 45 35.241	196.3 764.0	23 54 54 97 26 47	203 54 49 277 26 26	Thirty-four (U. S. E.)..... Thirty-two (U. S. E.).....	424.1 641.9	2.627453 2.807459
Star (U. S. E.), 1913.....	45 34 59.051 122 45 17.083	1823.1 370.3	74 00 41 109 49 09 279 02 12	254 00 23 299 48 56 99 02 16	Thirty-four (U. S. E.)..... Thirty-five 2 (U. S. E.)..... Thirty-seven (U. S. E.).....	583.3 453.7 446.2	2.769634 2.656784 2.649560
Thirty-six 2 (U. S. E.), 1913.....	45 34 42.879 122 45 15.396	1323.8 333.8	119 15 01 175 48 37 223 16 34	299 14 42 355 48 36 43 16 47	Thirty-four (U. S. E.)..... Star (U. S. E.)..... Thirty-seven (U. S. E.).....	690.2 500.6 589.5	2.839953 2.695513 2.770491
Twenty-six 2 (U. S. E.), 1913.....	45 36 07.968 122 47 03.762	246.0 81.5	244 56 18 295 57 50	64 56 45 115 58 24	Twenty-seven (U. S. E.)..... Twenty-nine (U. S. E.).....	898.8 1147.2	2.953687 3.059654
Twenty-four 2 (U. S. E.), 1913.....	45 36 36.714 122 47 20.617	1133.5 446.8	207 26 26 278 47 31	27 26 39 98 48 00	Twenty-three (U. S. E.)..... Twenty-five (U. S. E.).....	830.0 897.6	2.919066 2.953076
Nineteen 2 (U. S. E.), 1913.....	45 37 50.864 122 47 02.535	1570.3 54.9	55 16 46 133 29 09	235 16 21 313 28 51	Twenty (U. S. E.)..... Eighteen (U. S. E.).....	928.0 761.0	2.967571 2.881381
Seventeen 2 (U. S. E.), 1913.....	45 38 04.426 122 47 54.747	136.6 1185.5	98 17 20 176 59 33	278 16 57 356 59 32	Eighteen (U. S. E.)..... Fourteen (U. S. E.).....	728.4 716.8	2.862393 2.855392
Thirteen 2 (U. S. E.), 1913.....	45 38 18.577 122 46 38.781	573.5 839.9	126 02 17 177 19 09	306 02 04 357 19 08	Fourteen (U. S. E.)..... Twelve (U. S. E.).....	474.1 521.8	2.675874 2.717521
<i>Supplementary points.</i>							
Jetty A, target, 1909.....	46 12 35.051 123 57 51.323	1082.3 1100.2	139 19 50.2 214 41 41.9 274 30 32.6	319 16 13.2 34 43 47.7 94 31 05.6	Battery..... Scarboro Hill 2..... Port Stevens wharf Lighthouse.	9873.5 6555.4 984.0	3.994472 3.816601 2.993009
Jetty B, target, 1909.....	46 13 27.034 124 00 14.857	834.7 318.4	150 15 03.5 240 54 11.4 326 20 47.2	330 13 10.1 60 58 00.9 146 22 03.1	Battery..... Scarboro Hill 2..... Point Adams Lighthouse (un- used).	6774.2 7788.5 4066.6	3.830857 3.891454 3.609233
Jetty C, 1909.....	46 13 40.257 124 00 57.274	1243.1 1227.4	246 20 14.5 292 48 14.1 320 10 23.9	66 24 34.6 112 51 01.3 140 12 10.4	Scarboro Hill 2..... Port Stevens wharf Lighthouse. Point Adams Lighthouse. (un- used).	8422.2 5388.6 4938.8	3.925425 3.731472 3.693623
Jetty E, 1909.....	46 14 01.103 124 02 29.165	34.1 624.9	174 15 18.7 254 12 07.7 310 49 34.6	354 15 02.3 74 17 34.2 130 52 27.4	Battery..... Scarboro Hill 2..... Point Adams Lighthouse (un- used).	4852.9 10062.2 6784.2	3.686004 4.002695 3.831496
Jetty D, 1909.....	46 13 42.65 124 01 06.84	1316.9 146.6	247 20 14 318 56 31	67 24 41 138 58 25	Scarboro Hill 2..... Point Adams Lighthouse (un- used).	8581.5 5128.1	3.933565 3.709957
Jetty F, 1909.....	46 13 59.92 124 02 41.53	1850.1 889.9	177 23 54 309 10 15	357 23 47 129 13 17	Battery..... Point Adams Lighthouse (un- used).	4870.1 6963.6	3.687539 3.842836
West end of jetty, 1909.....	46 14 03.483 124 04 35.155	107.5 753.3	204 56 35.4 257 49 35.5 299 54 08.1	24 57 50.0 77 56 33.0 119 58 31.9	Battery..... Scarboro Hill 2..... Point Adams Lighthouse (un- used).	5244.7 12665.5 9038.4	3.719719 4.102621 3.956092
Navy east wireless, 1909-1911.....	46 17 55.874 124 04 27.399	1725.2 586.4	319 47 29.2 105 32 06.6	139 48 38.3 140 41 33.4 285 31 59.2	Battery..... Saddle Mountain 2..... North Head Lighthouse.....	3168.8 47404.2 228.4	3.500900 4.675817 2.358693
Cape Disappointment Astronomic, 1851-1874.	46 16 37.440 124 02 51.764	1156.0 1108.4	282 58 50.1 319 07 34.7	103 04 27.0 139 11 15.1	Scarboro Hill..... Point Adams.....	10250.2 9993.3	4.010731 3.999707
Jetty Sands Range rear light, May, 1913.	46 13 42.284 123 59 45.385	1305.6 972.6	146 42 03 212 49 39 310 35 08	326 39 57 32 50 56 130 36 38	East Battery..... Island (U. S. E.)..... Fort Stevens Longitude.....	6792.1 4241.0 3543.5	3.832007 3.627470 3.549437
St. Mary's Church, McGowans, 1913..	46 14 49.974 123 54 33.121	1543.1 709.5	42 19 49 55 27 51 108 34 33	222 17 33 235 25 54 288 32 05	Fort Stevens Longitude..... Desdemona Sands light..... Island (U. S. E.).....	5944.6 4219.3 4629.8	3.774119 3.625242 3.665568
Fort Columbla wharf light, May, 1913.	46 14 46.835 123 55 20.576	1446.2 440.8	34 47 06 46 57 55 111 26 08	214 45 26 226 56 32 291 20 51	Fort Stevens Longitude..... Desdemona Sands light..... East Battery.....	5233.6 3363.8 10096.8	3.718801 3.528832 4.004185
Jetty Sands Range front light, May, 1913.	46 13 50.899 123 59 58.009	1571.6 1243.0	217 55 23 279 15 09 310 57 48	37 56 50 99 17 06 130 59 28	Island (U. S. E.)..... Desdemona Sands light..... Fort Stevens Longitude.....	4180.7 3532.7 3922.1	3.621245 3.548112 3.593524

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
	° ' "		° ' "	° ' "		<i>Meters.</i>	
Columbia River Entrance Range front light, May, 1913.	46 15 37.177 123 57 51.551	1147.9 1104.1	357 32 48.6 96 30 29.5 109 04 07.4	177 32 57.0 276 30 24.8 280 00 39.3	Fort Stevens Longitude..... Island..... East Battery.....	5858.8 139.8 6524.1	3.767810 2.145426 3.814522
Sand Island light, May, 1913.....	46 15 36.310 123 57 53.619	1121.2 1148.4	114 15 20 238 50 12	294 15 17 58 50 13	Island..... Columbia River Entrance Range front light.	103.7 51.7	2.015988 1.713910
Fort Stevens wireless, north pole, 1913.	46 11 27.457 123 58 22.371	847.8 479.7	155 10 17 183 51 33 200 25 17	335 09 08 3 51 51 20 26 06	Jetty Sands Range front light... Island..... Desdemona Sands light.....	4850.5 7743.9 4119.0	3.688465 3.888957 3.614795
Fort Stevens, highest water tank, 1913.	46 11 52.089 123 57 37.716	1608.4 808.6	176 25 31 188 48 27 258 15 30	356 25 16 8 48 43 78 19 01	Island..... Desdemona Sands light..... Sands.....	6979.4 3136.4 6598.2	3.843816 3.496438 3.819425
Columbia River Entrance Range, rear light, May, 1913.	46 15 51.693 123 56 00.580	1596.2 12.4	18 39 42.3 80 15 32.0 101 09 57.8	198 38 30.5 260 14 07.1 281 05 09.5	Fort Stevens Longitude..... Island (U. S. E.)..... East Battery.....	6651.0 2552.3 8706.8	3.822884 3.406638 3.939558
Republic Splt Range, front light, May, 1913.	46 15 53.631 124 00 51.661	1656.0 1106.3	277 31 23 327 07 01 125 03 13	97 33 28 147 09 19 305 01 55	Island (U. S. E.)..... Fort Stevens Longitude..... East Battery.....	3750.8 7573.6 2821.9	3.574123 3.425918 3.450538
Republic Splt Range, rear light, May, 1913.	46 15 58.553 124 00 47.768	1808.0 1022.9	121 32 12 280 01 56 328 15 31	301 30 52 100 03 59 148 17 47	East Battery..... Island (U. S. E.)..... Fort Stevens Longitude.....	2808.1 3691.6 7657.5	3.448415 3.567219 3.884085
Chinook Church spire, 1913.....	46 16 25.131 123 56 42.741	776.0 915.2	47 45 10 94 52 54 7 27 30	227 44 15 274 48 36 187 27 06	Island (U. S. E.)..... East Battery..... Desdemona Sands light.....	2178.4 7667.1 5376.6	3.338138 3.884632 3.730507
Peacock Splt Range, front light, May, 1913.	46 15 49.201 124 00 06.335	1519.5 135.7	118 11 10 277 21 27 319 01 43	298 09 20 97 23 00 139 03 47	East Battery..... Island (U. S. E.)..... Desdemona Sands light.....	3721.8 2770.6 5590.0	3.570751 3.442579 3.747410
Peacock Splt Range, rear light, May, 1913.	46 15 50.368 124 00 01.483	1555.3 31.7	116 58 02 278 24 37 334 07 33	296 56 08 98 26 06 154 09 15	East Battery..... Island (U. S. E.)..... Fort Stevens Longitude.....	3797.2 2672.6 6957.5	3.579464 3.426911 3.842451
Taylor School, cupola, 1909.....	46 11 15.930 123 50 50.663	491.9 1086.5	106 26 09.4 122 47 30.6 146 01 44.8	286 21 38.8 302 38 49.9 325 58 46.9	Fort Stevens wharf light..... Battery..... Scarboro Hill 2.....	8379.2 18368.2 9446.2	3.922300 4.261066 3.975288
Astoria, Smith Point, iron chimney, 1909.	46 10 51.011 123 51 30.814	1575.1 660.9	113 37 36.5 126 18 37.9 152 48 53.7	293 33 34.9 306 10 26.2 332 46 24.8	Fort Stevens wharf light..... Battery..... Scarboro Hill 2.....	7832.6 18095.2 9670.9	3.893905 4.257563 3.985469
Youngs Bay Bridge, center draw, 1909.	46 10 35.055 123 52 00.522	1082.4 11.2	119 02 33.2 128 47 06.7 157 25 13.4	298 58 53.0 308 39 16.4 337 23 03.9	Fort Stevens wharf light..... Battery..... Scarboro Hill 2.....	7479.7 17890.1 9849.9	3.873882 4.252613 3.993432
Adair School, cupola, 1909.....	46 11 33.262 123 48 10.320	1027.1 221.3	99 06 57.7 116 31 46.6 129 53 09.9	279 00 31.4 296 21 10.0 309 53 16.2	Fort Stevens wharf light..... Battery..... Scarboro Hill 2.....	11620.8 21095.4 11368.3	4.065236 4.324388 4.055694
Astoria Court House, dome, ¹ 1909....	46 11 20.61 123 50 02.67	636.2 57.3	120 46 19 140 38 56	300 37 03 320 35 23	Battery..... Scarboro Hill 2.....	19167.1 9945.4	4.282356 3.997624
Point Adams Life Saving Station, flagpole, ¹ 1913.	46 12 02.10 123 56 45.04	64.8 965.7	166 54 48 259 02 09	346 54 26 79 05 08	Desdemona Sands Lighthouse... Sands.....	2864.8 5430.1	3.457100 3.734805
Flavels Wharf, post light, May, 1913...	46 11 37.265 123 55 27.879	1150.6 597.8	147 05 30 217 11 41 243 56 17	327 04 12 37 13 58 63 58 20	Desdemona Sands Lighthouse... Point Ellice (U. S. E.)..... Sands.....	4237.5 6739.8 4093.1	3.627111 3.828549 3.612053
Lower Sands light, May, 1913.....	46 11 34.563 123 53 06.861	1067.2 147.1	124 22 47 190 56 06 199 10 24	304 19 48 10 56 42 19 10 46	Desdemona Sands Lighthouse... Point Ellice (U. S. E.)..... Sands.....	6451.3 5551.9 1991.1	3.809647 3.744438 3.299098
Meglers water tank, spindle, 1913.....	46 15 04.275 123 51 19.925	132.0 426.8	249 05 05 299 15 01 50 23 58	69 08 48 119 19 14 230 23 16	Grays (U. S. E.)..... Tongue (U. S. E.)..... Point Ellice (U. S. E.).....	7083.5 8614.8 1606.5	3.850245 3.935246 3.205890
Knapton Channel light, May, 1913....	46 14 16.716 123 49 15.029	516.1 322.0	96 29 40 234 37 19 296 50 38	276 27 28 44 39 32 116 52 10	Point Ellice (U. S. E.)..... Grays (U. S. E.)..... Taylor.....	3938.9 5612.6 3061.9	3.593778 3.749167 3.485989
United States Quarantine Station, flagpole, 1913.	46 16 07.289 123 49 42.084	225.1 901.2	262 41 35 318 39 54 325 23 35	82 43 08 138 41 57 145 24 27	Grays (U. S. E.)..... Tongue (U. S. E.)..... Taylor.....	4559.0 8202.4 5828.7	3.658865 3.913941 3.765570
Knapton Saw Mill, cupola with flagpole, 1913.	46 16 22.148 123 48 54.190	683.9 1160.4	326 25 22 336 29 57 34 14 26	146 27 50 156 31 14 214 11 46	Tongue (U. S. E.)..... Taylor..... Sands.....	7042.1 5731.1 8464.1	3.899938 3.758238 3.927582
Grays Point light, May, 1913.....	46 16 26.100 123 45 59.283	805.9 1269.3	354 32 54 15 13 06 89 41 13	174 33 16 195 12 17 269 41 05	Tongue (U. S. E.)..... Taylor..... Grays (U. S. E.).....	6771.1 5573.4 248.8	3.830660 3.746123 2.395885
Smith Point light, May, 1913.....	46 11 34.055 123 50 44.151	1051.5 946.7	128 15 33 159 51 59 231 53 28	308 14 11 339 50 51 51 58 04	Sands..... Point Ellice (U. S. E.)..... Taylor.....	3063.2 5822.8 5899.4	3.486175 3.765130 3.770810

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds In meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
Finnish Lutheran Church spire, 1913..	46 11 17.294	534.0	136 06 59	316 05 40	Sands.....	Meters.	3.525002
	123 50 48.037	1030.2	162 12 12	342 11 07	Point Ellice (U. S. E.).....	3349.7	3.798320
Weather Bureau Tower, flagpole, ¹ 1913.	46 11 26.87	829.7	228 39 00	48 41 39	Taylor.....	6294.5	3.798958
	123 49 54.38	1166.1	121 23 49	301 21 52	Sands.....	4067.7	3.609350
Astoria Rear Rangelight, May, 1913..	46 11 04.050	125.3	151 38 39	331 36 55	Point Ellice (U. S. E.).....	6464.9	3.810563
	123 50 02.708	58.1	155 39 35	335 37 58	Grays (U. S. E.).....	7017.2	3.846165
Astoria Front Rangelight, May, 1913.	46 11 22.276	687.8	206 31 29	24 50 32	Taylor.....	11114.0	4.045870
	123 49 33.363	715.4	219 25 15	39 27 22	Point Ellice (U. S. E.).....	5911.3	3.771680
McClure's School cupola, flagpole, 1913.	46 11 14.427	445.5	148 52 38	328 50 39	Grays (U. S. E.).....	6811.2	3.833263
	123 50 03.706	79.5	204 48 06	24 50 32	Taylor.....	10334.3	4.014282
Alderbrook School, cupola, 1913.....	46 11 40.413	1247.8	217 58 20	38 00 05	Point Ellice (U. S. E.).....	5078.7	3.705756
	123 46 51.206	1097.9	154 42 03	334 40 26	Grays (U. S. E.).....	6717.6	3.827217
Buoy Depot flag, 1913.....	46 12 29.877	922.5	207 22 55	27 25 43	Taylor.....	10838.3	4.034962
	123 46 06.072	130.2	221 38 18	41 40 25	Sands.....	5681.8	3.754487
Marconi northeast wireless, tallest pole, Astoria, 1913.	46 11 05.932	183.2	102 58 23	282 54 14	Point Ellice (U. S. E.).....	7592.7	3.880396
	123 50 49.740	1066.7	127 01 01	306 57 05	Grays (U. S. E.).....	8760.6	4.206800
Marconi southwest wireless, Astoria, 1913.	46 11 05.277	162.9	185 35 18	5 35 47	Scarboro Hill 2.....	8861.8	3.947522
	123 50 52.368	1123.1	106 15 40.9	256 10 46.8	Fort Stevens Longitude.....	9148.0	3.961328
Post light, Sand Island, ¹ 1913.....	46 15 43.81	1352.8	124 41 55.0	304 33 22.4	East Battery.....	18484.2	4.268300
	123 58 24.90	533.2	146 56 59.5	326 54 00.9	Scarboro Hill 2.....	9714.5	3.987422
Navy west wireless, Astoria, ¹ 1913...	46 12 26.964	832.6	275 37 08	95 39 38	Fort Stevens Longitude.....	9099.5	3.959018
	124 04 33.618	719.5	350 56 32	170 57 05	East Battery.....	18449.4	4.265983
Gun (U. S. E.), 1905.....	46 12 26.964	832.6	211 51 56.3	327 14 39.7	Scarboro Hill 2.....	9700.9	3.986312
	123 57 40.778	874.1	225 18 19.1	45 18 19.8	Fort Stevens Longitude.....	27.90	1.445604
Smith (U. S. E.), 1905.....	46 11 24.491	756.2	101 50 43.5	281 45 32.8	Gun (U. S. E.).....	9430.7	3.974546
	123 50 30.231	648.3	142 56 40.3	322 53 27.6	Scarboro Hill 2 (U. S. E.).....	9485.6	3.977064
Old Point Ellice (U. S. E.), 1905.....	46 14 30.406	938.8	248 14 13.8	68 17 51.0	Tongue (U. S. E.).....	6946.3	3.841753
	123 52 19.417	416.0	245 37 14.0	65 41 40.1	Grays (U. S. E.).....	8663.1	3.937671
Seal (U. S. E.), 1905.....	40 12 01.511	46.7	289 46 53.7	109 51 49.8	Tongue (U. S. E.).....	9343.0	3.970485
	123 38 01.215	26.0	337 48 30.3	157 49 49.1	Smith (U. S. E.).....	6199.1	3.792328
Elliott (U. S. E.), 1905.....	46 15 38.376	1184.9	61 04 16.7	241 00 24.7	Gun (U. S. E.).....	7871.4	3.896052
	123 36 41.636	891.7	98 30 25.3	278 25 01.9	Tongue (U. S. E.).....	9711.1	3.987270
Marsh (U. S. E.), 1905.....	46 15 38.376	1184.9	160 29 48.7	340 28 19.5	Harrington (U. S. E.).....	7922.8	3.898878
	123 36 41.636	891.7	14 17 44.8	194 16 47.3	Seal (U. S. E.).....	6909.7	3.839462
Old Jim Crow (U. S. E.), 1905.....	46 13 52.180	1611.1	65 04 21.7	244 58 00.6	Tongue (U. S. E.).....	12471.9	4.095934
	123 33 48.276	1034.5	90 56 34.5	276 49 48.3	Grays (U. S. E.).....	12279.3	4.089172
Asteria (U. S. E.), ¹ 1905.....	46 13 52.180	1611.1	57 48 13.1	237 45 10.5	Seal (U. S. E.).....	6408.6	3.806763
	123 33 48.276	1034.5	131 27 31.4	311 25 26.2	Elliott (U. S. E.).....	4954.2	3.694976
Dot (U. S. E.), ¹ 1905.....	46 11 01.16	35.8	262 28 19.3	82 30 30.3	Raspberry (U. S. E.).....	3920.1	3.593299
	123 50 07.42	159.1	206 46 52	24 49 43	Three Tree Point (U. S. E.).....	3481.0	3.541710
Alderbrook (U. S. E.), ¹ 1905.....	40 11 41.71	1287.9	305 57 15.7	125 59 27.1	Raspberry (U. S. E.).....	4815.6	3.682048
	123 47 12.29	263.5	359 47 51.2	179 47 51.6	Marsh (U. S. E.).....	3341.0	3.523879
Old Tongue (U. S. E.), ¹ 1905.....	46 12 48.09	1484.9	89 03 25.6	269 01 20.8	Elliott (U. S. E.).....	3701.6	3.568385
	123 45 24.32	521.3	158 18 48	338 17 28	Old Point Ellice (U. S. E.).....	6421.5	3.807639
Bear (U. S. E.), ¹ 1905.....	46 11 01.16	35.8	210 03 01	30 06 07	Grays (U. S. E.).....	11021.3	4.042232
	123 40 40.72	873.4	204 05 36	54 12 52	Grays (U. S. E.).....	11239.3	4.050740
Lower Gauge Pile light, May, 1913....	46 11 01.16	35.8	236 46 52	26 49 43	Harrington (U. S. E.).....	15933.9	4.202322
	123 40 40.72	873.4	204 05 36	54 12 52	Old Point Ellice (U. S. E.).....	8394.3	3.923986
Gauge Pile, 1913.....	46 11 41.71	1287.9	188 30 53	8 31 37	Grays (U. S. E.).....	8877.6	3.948298
	123 45 24.32	521.3	171 34 15	351 33 41	Grays (U. S. E.).....	6803.7	3.832746
Gauge Pile, 1913.....	46 12 48.09	1484.9	228 36 03	48 39 54	Harrington (U. S. E.).....	9123.6	3.960164
	123 45 24.32	521.3	147 08 11	327 04 12	Grays (U. S. E.).....	13028.4	4.114891
Gauge Pile, 1913.....	46 10 31.76	980.6	184 18 16	4 18 42	Harrington (U. S. E.).....	10267.8	4.011476
	123 40 40.72	873.4	110 17 57	290 13 55	Point Ellice (U. S. E.).....	7638.8	3.883024
Gauge Pile, 1913.....	46 13 05.413	167.1	180 23 19	6 23 42	Grays (U. S. E.).....	6233.9	3.794760
	123 40 43.298	928.0	288 55 02	108 55 55	Tongue (U. S. E.).....	1677.4	3.224631
Gauge Pile, 1913.....	46 13 22.727	701.7	181 27 59	1 28 04	Grays (U. S. E.).....	5662.4	3.753002
	123 46 17.671	378.7	238 07 40	58 12 16	Harrington (U. S. E.).....	9403.8	3.973305
			316 06 45	136 07 20	Tongue (U. S. E.).....	1496.5	3.175071

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
Taylor Sands light, May, 1913.....	46 13 51.065 123 45 35.205	1576.7 754.4	356 16 31 170 55 32 239 58 47	176 16 35 350 55 06 60 02 46	Tongue (U. S. E.)..... Grays (U. S. E.)..... Harrington (U. S. E.).....	<i>Meters.</i> 1957.7 4846.3 8173.2	3.291755 3.685409 3.912394
Pulliam's Fish House, southeast corner, 1913.	46 13 23.940 123 44 19.603	739.2 420.1	53 14 02 157 02 03 227 56 16	233 13 11 337 00 42 47 59 20	Tongue (U. S. E.)..... Grays (U. S. E.)..... Harrington (U. S. E.).....	1864.2 6107.7 7351.4	3.270497 3.785879 3.866371
Megler's Fish House, flag, south gable, 1913.	46 12 17.176 123 41 05.339	530.3 114.5	190 31 36 249 56 32 254 10 43	10 32 20 70 00 29 74 12 46	Harrington (U. S. E.)..... Wharf..... Water.....	7103.7 7495.9 3797.9	3.851483 3.874823 3.579545
Beacon No. 1, May, 1913.....	46 13 56.026 123 43 55.267	1729.9 1184.3	43 43 50 147 55 08 231 26 59	223 42 42 327 53 30 51 29 46	Tongue (U. S. E.)..... Grays (U. S. E.)..... Harrington (U. S. E.).....	2915.0 5468.1 6312.4	3.464641 3.737837 3.800192
Tongue Point Neck, 1851.....	46 12 18.831 123 45 58.357	581.4 1251.1	75 03 28.1 116 33 21.4 180 48 40.8	255 00 17.3 296 28 46.5 0 48 44.5	Astor Point..... Point Ellice..... Grays Point.....	5866.0 9116.9 7673.2	3.768344 3.959848 3.884979
Shortis chlmney, ¹ 1852-85	46 11 49.08 123 46 58.84	1515.4 1261.6	126 03 02 189 16 46	305 59 11 9 17 33	Point Ellice..... Grays Point.....	8484.0 8705.0	3.928600 3.939771
Yellow Bluff, 1851.....	46 16 33.154 123 40 41.884	1023.7 896.8	41 07 13.6 88 29 02.3	221 03 49.4 268 25 17.3	Tongue Point..... Grays Point.....	9211.6 6669.9	3.964337 3.824118
John Day Point, ¹ 1852	46 10 54.14 123 44 18.91	1671.7 405.6	168 53 15 228 05 02	348 52 07 48 10 32	Grays Point..... Rocky Point.....	10484.2 13145.5	4.020537 4.118776
Settlers Point, 1852.....	46 10 32.521 123 40 33.244	1004.1 713.0	123 54 14.0 147 58 56.0 207 39 23.5	303 50 43.3 327 55 04.9 27 42 10.3	Tongue Point..... Grays Point..... Rocky Point.....	7522.1 12924.9 10661.6	3.876341 4.111427 4.027823
Grays Bay, 1852.....	46 17 20.120 123 43 38.316	621.2 820.2	290 59 08.5 15 10 28.6	111 01 16.0 195 09 11.9	Yellow Bluff..... Tongue Point.....	4046.0 8695.3	3.607022 3.939286
Grays River, ¹ 1852	46 17 55.457 123 41 15.667	1712.3 335.3	344 06 42.0 70 21 00.1	164 07 06.4 250 19 17.0	Yellow Bluff..... Grays Bay.....	2642.1 3242.4	3.421957 3.510863
Beacon No. 2, May, 1913.....	46 14 03.549 123 42 53.726	109.6 1151.3	54 57 35 136 11 37 224 21 35	234 55 42 316 09 14 44 23 37	Tongue (U. S. E.)..... Grays (U. S. E.)..... Harrington (U. S. E.).....	4072.3 6099.0 5178.0	3.609842 3.785262 3.713991
Beacon No. 4, May, 1913.....	46 14 44.729 123 41 28.762	1381.1 616.2	55 00 41 117 24 05 216 32 18	234 57 47 297 20 41 36 33 19	Tongue (U. S. E.)..... Grays (U. S. E.)..... Harrington (U. S. E.).....	6292.8 6804.6 3022.3	3.798841 3.832802 3.480342
Scappoose Johnson Fish House, flag, northwest gable, 1913.	46 14 42.152 123 41 23.859	1301.5 511.1	117 35 12 214 02 38 310 20 32	297 31 44 34 03 35 130 22 48	Grays (U. S. E.)..... Harrington (U. S. E.)..... Water.....	6934.5 3026.6 5314.9	3.841015 3.480957 3.725498
Grays Bay light, May, 1913	46 16 03.699 123 43 41.067	114.2 879.4	20 58 50 102 09 26 270 06 18	200 57 32 282 07 38 90 08 55	Tongue (U. S. E.)..... Grays (U. S. E.)..... Harrington (U. S. E.).....	6477.9 3281.9 4632.6	3.811433 3.516120 3.665826
Rocky Point light, May, 1913.....	46 17 20.315 123 43 38.352	627.3 821.0	303 19 11 320 11 51 15 46 45	123 24 59 140 15 45 195 45 25	Wharf..... Water..... Tongue (U. S. E.).....	12350.7 10831.8 8743.5	4.091692 4.034701 3.941687
Pile, Grays Bay, 1913.....	46 16 34.484 123 42 28.528	1064.8 610.8	28 58 11 46 42 14 73 15 37	208 56 00 226 38 52 253 08 31	Tongue (U. S. E.)..... Taylor..... Point Ellice (U. S. E.).....	7999.0 8215.8 13181.2	3.903038 3.914648 4.119955
Alamicut Point, ¹ 1852	46 18 05.26 123 42 50.06	162.4 1071.4	316 00 56 36 32 28	136 02 29 216 31 53	Yellow Bluff..... Grays Bay.....	3951.9 1734.9	3.596801 3.239264
Altoona Cannery, main building, south gable, 1913.	46 15 57.785 123 39 17.060	1784.2 365.3	311 56 50 347 00 23 99 35 15	131 59 29 167 01 08 279 34 41	Wharf..... Water..... Harrington (U. S. E.).....	6347.5 5928.9 1035.4	3.802603 3.772976 3.015102
Harrington Point Rear Rangellight, ¹ April, 1913.	46 16 02.64 123 39 13.01	81.5 278.6	53 18 14 80 32 00	233 13 42 260 22 33	Tongue (U. S. E.)..... Point Ellice (U. S. E.).....	10058.8 17043.5	4.002547 4.231560
Klevenhausen store, flag pole, 1913...	46 15 56.019 123 39 06.402	1729.7 137.1	312 59 40 349 04 30 100 18 01	133 02 11 169 05 07 280 17 19	Wharf..... Water..... Harrington (U. S. E.).....	6142.3 5828.3 1269.6	3.788332 3.765539 3.103678
Miller Sands Fish House, flag pole, 1913.	46 15 24.974 123 38 47.000	771.1 1006.7	265 51 04 308 23 31 351 46 26 60 39 32	85 54 40 128 25 49 171 46 49 240 34 42	Jim Crow (U. S. E.)..... Wharf..... Water..... Tongue (U. S. E.).....	6410.0 5201.5 4813.6 9891.8	3.806859 3.716128 3.682473 3.995276
Fish House, leaning stack, 1913.....	46 13 45.824 123 36 50.650	1414.9 1085.6	46 40 31 183 02 12 276 07 46	226 39 30 3 02 18 96 08 39	Water..... Rocky Point 2..... Wharf.....	2481.3 3481.1 1592.8	3.394673 3.541717 3.202158
Fish House, west barrel, 1913.....	46 14 23.355 123 36 27.671	721.1 592.9	172 25 53 235 15 47 320 36 55	352 25 42 55 17 42 140 37 32	Rocky Point 2..... Jim Crow (U. S. E.)..... Wharf.....	2337.8 4148.6 1719.5	3.368799 3.617903 3.235405

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
Fish House, Stack, 1913.....	° ' "		° ' "	° ' "		<i>Meters.</i>	
	46 14 40.954	1264.5	51 56 35	231 55 15	Wharf.....	3036.8	3.482422
	123 33 45.174	967.8	59 31 19	239 28 05	Water.....	6707.8	3.826581
			177 46 02	357 46 00	Jim Crow (U. S. E.).....	1821.0	3.260299
Brookfield Cannery, 1913.....	46 15 52.754	1628.9	267 11 18	87 15 33	Lower Skumaque.....	7586.1	3.880018
	123 33 34.011	728.3	263 54 38	83 56 22	Three Tree Point (U. S. E.).....	3107.7	3.492446
			32 45 14	212 43 45	Wharf.....	4861.9	3.686807
Three Tree Point light, ¹ June, 1913...	46 16 03.26	100.7	223 39 50	43 39 50	Three Tree Point (U. S. E.).....	6.32	0.800717
	123 31 09.91	212.2					
Bay View light, May, 1913.....	46 16 26.986	833.2	293 14 54	113 15 48	Lower Skumaque.....	1746.4	3.242140
	123 28 55.116	1180.1	29 18 20	209 16 59	Raspberry (U. S. E.).....	4893.3	3.689602
			75 50 07	255 48 30	Three Tree Point (U. S. E.).....	2972.5	3.473119
Bay View light (new), July, 1913.....	46 16 27.708	855.5	305 32 16	125 33 48	Stump.....	3342.1	3.524016
	123 28 55.324	1184.5	317 39 53	137 42 29	Dike.....	6851.7	3.835801
			75 23 53	255 22 16	Three Tree Point (U. S. E.).....	2973.7	3.473297
Stack Fish House, 1913.....	46 15 52.186	1611.3	30 35 40	210 34 36	Raspberry (U. S. E.).....	3709.1	3.569265
	123 29 18.795	402.5	98 18 36	278 17 16	Three Tree Point (U. S. E.).....	2400.2	3.380255
			259 39 30	79 40 41	Lower Skumaque.....	2146.5	3.331734
Skumaque School, square cupola, 1913	46 16 14.956	461.8	338 41 34	158 43 02	Pole.....	7183.9	3.856361
	123 27 16.960	363.2	82 40 49	262 36 06	Jim Crow (U. S. E.).....	8454.2	3.927070
			85 55 50	265 53 02	Three Tree Point (U. S. E.).....	4966.7	3.698680
Hunting Island Rear Range light, ¹ June, 1913.	46 13 45.15	1394.1	58 25 57	238 25 54	Dike.....	90.5	1.956649
	123 35 07.301	351.2					
Pillar Rock Cannery, flagpole, 1913...	46 15 38.839	1199.2	9 47 11	189 46 50	Wharf.....	3713.8	3.569820
	123 35 07.301	156.4	89 38 01	269 36 53	Rocky Point 2.....	2029.3	3.307338
			268 53 47	88 54 44	Jim Crow (U. S. E.).....	1688.3	3.227440
Pillar Rock, 1913.....	46 15 30.815	951.5	96 50 32	276 49 26	Rocky Point 2.....	1970.6	3.294600
	123 35 10.693	229.0	260 57 16	80 58 15	Jim Crow (U. S. E.).....	1782.8	3.251100
			9 17 50	189 17 31	Wharf.....	3457.4	3.538754
Pillar Rock Channel Front Range light, May, 1913.	46 15 38.798	1198.0	10 08 42	190 08 20	Wharf.....	3716.6	3.570147
	123 35 06.210	133.0	37 55 36	217 53 20	Water.....	6579.2	3.818174
			89 40 24	269 39 15	Rocky Point 2.....	2052.6	3.312309
Pillar Rock Channel Rear Range light, ¹ May, 1913.	46 15 38.93	1202.0	80 24 24	260 24 16	Pillar Rock Channel Front Range light.	251.7	2.400840
	123 34 54.62	1169.8					
Jim Crow Point light, ¹ June, 1913.....	46 15 39.97	1234.1	3 55 41	183 55 41	Jim Crow (U. S. E.).....	2.6	0.414973
	123 33 48.48	1038.3					
Elliott Point light, ¹ May, 1913.....	46 15 38.53	1189.7	274 43 18	94 43 20	Rocky Point 2.....	45.24	1.655523
	123 36 44.15	945.5					
Tongue Point light, ¹ May, 1913.....	46 12 29.88	922.6	89 00 35	269 00 35	Buoy Depot flag.....	5.2	0.716003
	123 46 05.83	125.0					
Off Works Stack, western one, 1913...	46 10 51.824	1600.2	137 28 39	317 26 06	Desdemona Sands Lighthouse...	6732.4	3.828170
	123 53 42.981	921.9	195 06 02	15 07 03	Point Ellice (U. S. E.).....	7013.0	3.845901
			204 02 58	24 03 46	Sands.....	3504.6	3.544640
			239 42 56	59 47 42	Taylor.....	9813.5	3.991824
Welch, ¹ 1871.....	46 15 18.25	563.5	108 59 10	288 56 53	Three Tree Point.....	4314.8	3.634963
	123 27 59.31	1270.3	211 30 19	31 30 58	Skumaque.....	2196.7	3.341774
Welch's Fish House, northeast gable, ¹ 1871.	46 15 05.43	167.7	112 03 28	292 00 58	Three Tree Point.....	4792.9	3.680599
	123 27 42.41	908.5	199 06 29	19 06 55	Skumaque.....	2401.0	3.380397
Puget, 1871.....	46 12 23.484	725.1	35 36 01.3	215 35 28.8	Hunts Mill Point.....	1661.7	3.220553
	123 25 17.872	383.1	212 24 10.6	32 25 35.7	Lokamin.....	4709.3	3.672954
			284 25 11.0	104 26 58.8	Birnie.....	3306.1	3.519315
Birnie's House, northwest gable, 1871.	46 12 02.699	83.3	312 56 41.4	132 56 53.0	Point Basalt.....	470.8	2.672806
	123 22 57.812	1239.5	312 30 33.8	132 30 40.5	Birnie.....	269.9	2.431171
			79 53 15.8	259 51 02.2	Hunts Mill Point.....	4033.2	3.605654
Point Basalt, 1871.....	46 11 52.311	1615.2	0 39 18.8	180 39 16.0	Westport.....	7281.7	3.862235
	123 22 41.741	894.9	84 52 21.8	264 49 56.6	Hunts Mill Point.....	4332.5	3.636742
			133 31 58.4	313 31 53.5	Birnie.....	200.9	2.302934
			312 58 59.0	133 01 10.8	Anderson.....	5353.5	3.728639
Tenasliikee, ¹ 1871.....	46 14 05.816	179.6	75 27 40.2	255 25 41.5	Quinn.....	3640.0	3.561106
	123 26 10.300	220.7	163 53 55.0	343 53 15.0	Skumaque.....	4277.3	3.631168
Snag (U. S. E.), ¹ 1905.....	46 13 59.06	1823.6	201 07 43	21 08 23	Elliott (U. S. E.).....	3287.8	3.516904
	123 37 36.97	792.2	237 21 06	57 23 51	Old Jim Crow (U. S. E.).....	5803.0	3.763655
Skamokowa (U. S. E.), ¹ 1905.....	46 16 18.54	572.5	48 58 53	228 56 18	Raspberry (U. S. E.).....	6102.2	3.785486
	123 27 12.02	257.4	84 46 46	264 43 55	Three Tree Point (U. S. E.).....	5111.0	3.708507
Pole, 1913.....	46 12 38.175	1178.7	153 20 48.6	333 20 13.1	Mud.....	2346.5	3.370426
	123 25 15.186	325.5	158 47 56.6	338 46 49.3	Stump.....	5517.8	3.741765
			177 04 55.2	357 04 51.7	Dike.....	2023.1	3.306018

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
Upper Skumaquea light, June, 1913..	46 14 50.326 123 25 53.405	1553.9 1251.1	338 13 00 3 38 56 77 11 21	158 13 28 183 38 52 257 10 32	Dike..... Mud..... Ten.....	Meters. 2218.2 1987.3 1489.8	3.346002 3.298261 3.173128
Bugby Hole Eccentric, 1913.....	46 10 31.795 123 25 44.413	981.7 952.7	177 50 58 185 02 58	357 50 48 5 03 16	Upper Skumaquea light..... Dike.....	7988.1 5945.7	3.902444 3.774204
Bugby Hole Eccentric reference mark, ¹ 1913.	46 10 30.839 123 25 45.429	952.2 974.5	216 26 22	36 26 23	Bugby Hole Eccentric.....	36.71	1.56478
Chimney House, ¹ 1913.....	46 14 18.59 123 26 33.12	574.0 709.7	170 55 58 304 34 06	350 55 47 124 34 59	Stump..... Dike.....	2069.3 1903.2	3.315828 3.279488
Chimney House, south end Tenaslll- hee Island, ¹ 1913.	46 12 34.75 123 26 14.96	1073.0 320.7	208 59 03 265 16 20	88 59 43 25 17 03	Dike..... Pole.....	2430.9 1285.7	3.385765 3.109146
Bugby Hole light, June, 1913.....	46 10 31.938 123 25 43.840	986.1 940.4	177 45 38 184 56 08	357 45 27 4 56 25	Upper Skumaquea light..... Dike.....	7984.2 5940.3	3.902231 3.773806
Cathlamet light, June, 1913.....	46 11 54.076 123 22 54.449	1669.7 1167.4	114 18 09 130 22 46	294 16 28 310 20 29	Pole..... Mud.....	3310.2 5340.8	3.519858 3.727609
Burroughs, ¹ 1872.....	46 10 39.36 123 20 38.68	1215.3 829.6	28 27 22 105 02 01	208 25 51 284 58 07	Westport..... Hunts Mill Point.....	5719.1 7200.5	3.757331 3.857363
Sandy Point, 1872.....	46 10 06.929 123 20 28.780	213.9 617.4	138 46 55.2 290 28 43.1	318 45 19.2 110 29 18.9	Point Basalt..... Anderson.....	4326.6 1135.6	3.636142 3.053224
Mouth, ¹ 1872.....	46 08 40.52 123 22 52.24	1251.1 1121.2	354 02 09 143 32 01	174 02 14 323 29 44	Westport..... Hunts Mill Point.....	1367.0 6881.7	3.135769 3.837694
Gruber, ¹ 1873.....	46 07 15.85 123 21 00.99	489.4 21.3	119 11 52 199 45 37	299 10 37 19 46 36	Westport..... Anderson.....	2572.9 5190.7	3.410431 3.715229
Skunk Cahbago Rldge, ¹ 1873.....	46 06 33.28 123 17 21.35	1027.6 458.5	181 16 29 253 25 31	1 16 33 73 27 50	Capo Horn..... Clatskanie.....	4830.2 4320.5	3.684778 3.635355
Holland, 1873.....	46 10 14.300 123 12 03.141	441.5 67.4	71 48 26.4 218 14 21.3	251 46 09.6 38 15 11.8	Cooper..... Abernathy.....	4281.4 2426.1	3.631581 3.384906
Wallaces Island, 1873.....	46 09 10.177 123 13 39.579	314.2 849.3	107 48 57.6 222 34 10.5 226 15 12.5	287 47 50.4 42 36 10.6 46 16 22.1	Cooper..... Abernathy..... Holland.....	2098.7 5276.9 2863.8	3.321958 3.722382 3.456936
Eagle Cliff, 1873.....	46 10 38.921 123 12 30.115	1201.7 645.9	322 43 17.2 28 32 54.5 58 59 11.7	142 43 36.7 208 32 04.4 238 57 14.4	Holland..... Wallaces Island..... Cooper.....	955.4 3119.1 4070.4	2.980163 3.494031 3.609642
Hapgood House chimney, ¹ 1873.....	46 10 24.06 123 13 34.14	742.9 732.3	278 45 46 2 55 50	98 46 51 182 55 46	Holland..... Wallaces Island.....	1975.1 2284.0	3.295591 3.358704
G. Hume's house chimney, ¹ 1873.....	46 10 17.93 123 13 52.36	553.6 1123.1	272 43 40 352 32 02	92 44 59 172 32 11	Holland..... Wallaces Island.....	2345.5 2109.8	3.370239 3.324244
Alder Bluff, ¹ 1873.....	46 11 17.60 123 05 17.70	543.4 379.6	14 13 02 93 20 21	194 12 42 273 18 26	Greens Point..... Nequally.....	2463.7 3418.8	3.391504 3.533878
Monticello, ¹ 1873.....	46 07 27.39 122 55 13.99	845.7 300.4	4 13 00 96 47 11	184 12 49 276 44 18	Rainier..... Mount Collip.....	4192.7 5182.2	3.622496 3.714513
Cowlitz, ¹ 1873.....	46 05 59.22 122 55 05.21	1828.5 111.9	255 04 15 18 48 27	75 06 02 108 48 10	Coweman..... Rainier.....	3295.4 1541.3	3.517911 3.187884
Mountain top, back of Westport, 1873.	46 05 14.633 123 27 05.276	451.8 113.4	240 03 30.2 241 46 08.5 252 12 33.4 257 33 02.4	60 10 34.7 61 57 49.3 72 25 23.2 77 42 22.1	Cape Horn..... Abernathy..... Bradbury..... Clatskanie.....	14584.6 23663.0 24072.0 17080.3	4.163804 4.374070 4.381513 4.232496
Cottonwood Island, ¹ 1873.....	46 05 18.95 122 53 55.55	585.1 1193.5	218 54 25 352 38 40	38 55 21 172 38 50	Coweman..... Galloway.....	2687.8 2427.9	3.429401 3.385235
Episcopal Church cross, Kalama, ¹ 1873	46 00 38.43 122 50 34.24	1186.6 736.7	37 43 40 107 53 36	217 42 45 287 52 12	Hunter..... Gobles Point.....	2699.8 2630.5	3.431330 3.421026
Methodist Church spire, Kalama, ¹ 1873.	46 00 27.57 122 50 29.39	851.3 632.3	44 17 59 113 40 06	224 17 00 293 38 39	Hunter..... Gobles Point.....	2514.9 2853.4	3.400529 3.453357
Walker Island light, 1913.....	46 08 57.846 123 02 44.566	1786.0 956.4	290 02 13 297 36 16 300 12 31	110 02 58 117 38 46 120 15 49	Barlow..... Quarry..... Slaughter.....	1402.9 4995.0 6816.8	3.147025 3.695538 3.833579
Barlow Point Range, front light, 1913.	46 08 43.659 123 01 46.892	1348.0 1006.4	298 04 50 33 32 20	118 04 53 213 31 43	Barlow..... Rinearson.....	90.9 1707.8	1.958373 3.232428
Barlow Point Range, rear light, ¹ 1913.	46 08 42.06 123 01 42.60	1298.6 914.3	118 40 22	298 40 22	Barlow.....	13.74	1.13799
Walker Island Dike light, 1913.....	46 08 08.966 123 01 33.642	276.8 722.2	285 31 00 73 59 47 168 45 09	105 32 38 253 59 06 348 46 02	Quarry..... Rinearson..... Barlow.....	3013.6 1277.5 1048.5	3.479090 3.106355 3.020570

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Supplementary points—Continued.</i>							
La Du light, 1913.....	46 07 55.865 122 59 46.606	1724.9 1000.4	308 35 17 306 16 03 90 51 52	123 35 37 126 17 11 270 49 54	Quarry..... Slaughter..... Rinearson.....	<i>Meters.</i> 727.3 2567.2 3526.1	2.861733 3.409454 3.547296
White Tree, three prongs, 1913.....	46 07 10.013 123 00 12.792	309.2 274.6	116 21 40 145 45 19 229 03 16	296 20 00 325 44 14 49 03 55	Rinearson..... Barlow..... Quarry.....	3307.5 3446.4 1546.4	3.519500 3.537368 3.189330
Mount Coffin light, ¹ 1913.....	46 07 42.76 122 59 18.16	1320.2 389.9	113 20	293 20	Quarry.....	5.3	0.72427
Slaughter Island Bar Range, rear light, 1913.	46 07 10.877 122 58 12.088	335.9 259.5	342 45 08 104 34 11 124 44 12	162 45 09 284 31 04 304 43 24	Slaughter..... Rinearson..... Quarry.....	136.0 5739.2 1731.9	2.133502 3.758854 3.238522
Kelso, school, ¹ 1913.....	46 08 52.82 122 54 20.84	1631.0 447.3	72 09 04 80 49 59	252 05 33 260 44 06	Mount Coffin..... Rinearson.....	6604.8 10654.8	3.819857 4.027547
Kelso, square tower, ¹ 1913.....	46 08 49.80 122 54 20.07	1539.6 430.7	72 57 05 81 19 57	252 53 33 261 14 03	Mount Coffin..... Rinearson.....	6593.2 10657.1	3.819095 4.027638
Kelso, white church, red spire, ¹ 1913.....	46 08 33.46 122 54 15.84	1033.2 340.0	74 49 01 82 27 03	254 45 26 262 21 06	Mount Coffin..... Rinearson.....	6625.8 10719.3	3.821239 4.030168
Bournes House, west gable, 1913.....	46 05 52.00 122 57 33.49	1605.5 719.4	245 36 11 261 59 48	65 36 51 82 00 46	Hut (U. S. E.)..... Wood 2 (U. S. E.).....	1296.5 1743.2	3.112757 3.241356
Beaver Dock Building, north gable, 1913.	46 05 28.50 122 56 04.70	880.0 101.0	240 41 51 294 18 21	60 42 49 114 18 58	Cowlitz 2 (U. S. E.)..... Bluff (U. S. E.).....	1992.4 1193.5	3.299369 3.076324
Ranier Mineral Soap factory, 1913.....	46 05 22.82 122 55 45.12	704.6 969.3	228 51 20 295 19 35	48 52 04 115 19 58	Cowlitz 2 (U. S. E.)..... Bluff (U. S. E.).....	1748.8 738.0	3.242729 2.868065
Ranier Church, steeple, 1913.....	46 05 16.88 122 55 55.05	521.2 1182.7	163 41 33 186 28 03	343 41 20 6 28 07	Wood 2 (U. S. E.)..... Net 2 (U. S. E.).....	1382.4 1210.2	3.140646 3.082860
Crib No. 1, 1913.....	46 05 48.73 122 55 37.22	1504.6 799.5	335 58 43 24 35 28	155 59 00 204 35 16	Bluff (U. S. E.)..... Ranier 2 (U. S. E.).....	1221.7 847.2	3.086975 2.928002
Crib No. 4, 1913.....	46 05 52.42 122 56 02.07	1618.5 44.5	320 00 55 348 24 55	140 01 30 168 25 01	Bluff (U. S. E.)..... Ranier 2 (U. S. E.).....	1604.7 902.5	3.205401 2.955444
Cowlitz River light, 1913.....	46 05 31.944 122 54 47.682	986.3 1024.4	305 55 28.1 312 22 26.9 335 26 21.5	125 56 38.0 132 23 53.6 155 26 44.5	Cottonwood Island..... Cotton..... Old.....	2572.9 3500.0 1650.5	3.410428 3.544070 3.217606
Crib No. 8, 1913.....	46 06 03.29 122 56 36.59	101.6 786.0	350 50 00 24 39 38	170 50 04 204 39 26	Dock (U. S. E.)..... Mill (U. S. E.).....	881.8 871.8	2.945353 2.940421
Crib No. 11, 1913.....	46 06 15.65 122 57 03.53	483.2 75.8	38 28 29 78 41 59	218 28 08 258 41 11	Bourne (U. S. E.)..... Tangent (U. S. E.).....	1006.8 1448.2	3.002925 3.160838
Schoolhouse, flagpole, 1913.....	46 05 20.60 122 56 18.06	636.0 388.0	163 42 57 184 59 42	343 42 43 4 59 40	Hut (U. S. E.)..... Wood 2 (U. S. E.).....	1567.7 1216.5	3.195253 3.085096
Columbia River Door Co. Dock, water tank, 1913.	46 05 35.84 122 56 53.44	1106.6 1148.1	197 12 17 229 25 17	17 12 28 49 25 46	Hut (U. S. E.)..... Wood 2 (U. S. E.).....	1082.9 1140.0	3.094575 3.056894
Bushes Dock, front gable, 1913.....	46 07 37.80 122 59 00.40	1169.0 9.9	311 44 35 111 46 02	131 45 11 291 45 49	Slaughter 2 (U. S. E.)..... Quarry (U. S. E.).....	1446.2 414.2	3.160237 2.617220
Nusoms House, west gable, 1913.....	46 05 08.83 122 55 02.39	272.6 51.4	194 09 04 270 34 19	14 09 17 90 35 24	Cowlitz 2 (U. S. E.)..... D 10 (U. S. E.).....	1631.9 1949.7	3.212699 3.289977
Flagpole, 1913.....	46 05 37.69 122 56 54.20	1163.7 1164.4	277 31 57	97 31 57	Mill (U. S. E.).....	14.69	1.167022
Enterprise Landing, rear light, ¹ 1913.....	46 00 09.55 122 52 27.95	394.9 601.4	308 54	128 54	Enterprise Landing, front light..	181.6	2.25912
Last pile log boom, ¹ 1913.....	46 03 26.24 122 52 18.36	810.0 394.6	68 26 46 192 50 35	248 26 09 12 50 45	Dock..... Rail.....	1168.0 1367.6	3.067458 3.135959
Cottonwood Island light, lower rear, 1913.	40 03 55.714 122 52 48.080	1720.2 1033.3	18 28 18 102 21 44 245 49 14	198 28 03 282 21 05 65 49 46	Dock..... Cut..... Rail.....	1412.1 1175.8 1033.4	3.149868 3.070338 3.014280
Cottonwood Island light, upper and lower front, 1913.	46 04 06.366 122 53 04.631	196.6 99.5	84 26 13 173 24 42	264 25 47 353 24 38	Cut..... Cottonwood Island light, upper rear. Cotton.....	796.6 1139.9 466.6	2.901241 3.056850 2.668895
Cottonwood Island light, upper rear, ¹ 1913.	46 04 43.254 122 53 10.722	1335.5 230.4	359 12	179 12	Cottonwood Island.....	6.6	0.81954
Stack, Western Lumber Co., 1913.....	46 04 29.560 122 54 02.018	912.7 43.4	145 12 59 249 18 38	325 12 49 69 19 15	Old..... Cottonwood Island light, upper rear. Cotton.....	517.4 1178.3 1661.7	2.713854 3.071260 3.220566
Small house on shore, pipe, ¹ 1913.....	46 00 01.29 122 54 41.91	39.8 900.2	340 18 14 346 51 34	160 18 58 166 51 53	Cut..... Old.....	3850.8 2472.0	3.585548 3.393041

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Supplementary points—Continued.</i>							
Chimney, near white house, ¹ 1913.....	46 00 12.85 122 50 31.33	396.7 674.2	0 45 54 144 36 26	180 45 54 324 36 21	H 23 ₁ (U. S. E.)..... Kalama.....	632.8 295.3	2.801265 2.470240
Red barn, cupola, 1913.....	46 01 24.163 122 53 57.461	746.0 1236.1	294 40 55 302 36 53 320 34 26	114 43 18 122 39 22 140 36 15	Kalama..... H 23 ₁ (U. S. E.)..... Slue.....	4692.8 5256.1 5121.9	3.671432 3.720662 3.709434
Church, Goble, 1913.....	46 00 58.538 122 52 31.108	1807.4 669.2	295 55 17 308 29 28 336 13 54	115 56 37 128 30 54 156 14 40	Kalama..... H 23 ₁ (U. S. E.)..... Slue.....	2675.2 3282.2 3450.3	3.427359 3.516168 3.538993
Stack, Mountain Lumber Co., 1913...	46 01 23.696 122 51 41.004	731.7 882.1	67 19 47 145 14 23 355 25 12	247 19 11 325 13 24 175 25 22	Knight..... Carr..... Slue.....	1162.6 3049.5 3955.5	3.065412 3.484229 3.597201
Coffin Rock light, 1913.....	46 02 09.121 122 52 50.452	281.6 1085.0	194 58 39 309 46 08 344 55 26	14 59 12 129 46 41 164 55 27	Rail..... Bank..... Coffin Rock (U. S. E.).....	3845.0 1287.0 167.8	3.584901 3.109594 2.224839
Cable landing, north side sign post, 1913.	46 02 21.251 122 52 24.068	656.1 517.6	44 18 30 131 51 10 148 34 37	224 18 13 311 50 43 328 34 06	Coffin Rock (U. S. E.)..... Carr..... Dock.....	749.8 1091.2 1848.3	2.874930 3.037902 3.266782
Tank, Beaver Lumber Co., 1913.....	46 03 12.639 122 53 14.070	390.2 302.5	181 28 43 196 27 57 220 34 18 274 50 13	1 28 45 16 28 16 40 35 08 94 50 16	Cottonwood Island light..... Cotton..... Rail..... Dock.....	2792.1 2024.7 2308.3 111.7	3.445934 3.306371 3.363290 2.048061
West stack, Beaver Lumber Co., ¹ 1913.	46 03 11.35 122 53 15.04	350.3 323.4	181 52 52 196 42 32	1 52 55 16 42 52	Cottonwood Island light..... Cotton.....	2822.6 2068.9	3.452183 3.315748
New Enterprise Landing front light, ¹ 1913.	46 00 06.91 122 52 22.83	213.3 491.3	259 12 43 280 37 56	79 13 58 100 39 16	Kalama..... H 23 ₁ (U. S. E.).....	2268.1 2432.7	3.355671 3.386096
Sandy Island Channel, front light, 1913.	45 59 55.232 122 52 11.426	1705.3 245.9	248 23 57 272 21 34 321 17 50	68 25 03 92 22 46 141 18 22	Kalama..... H 23 ₁ (U. S. E.)..... Slue.....	2132.3 2147.3 1552.3	3.328856 3.331890 3.190978
Ahle Point light, 1913.....	45 59 53.939 122 50 37.699	1665.4 811.2	41 46 42 152 27 47 177 38 10	221 46 07 332 27 00 357 38 09	Slue..... Mil..... Kalama.....	1571.0 3100.3 825.3	3.196165 3.491398 2.916603
Shingle mill stack, Ahle Point, 1913..	45 59 55.581 122 50 36.398	1716.1 783.2	41 19 28 151 33 45 175 25 03	221 18 52 331 32 56 355 25 01	Slue..... Mil..... Kalama.....	1627.5 3068.6 776.4	3.211511 3.486945 2.890069
Sandy Island house, pipe, ¹ 1913.....	46 00 29.04 122 51 47.19	896.7 1015.2	280 03 11 348 44 18	100 04 00 168 44 33	Kalama..... Slue.....	1484.0 2299.7	3.171438 3.361664
School, Kalama, 1913.....	46 00 31.591 122 50 18.465	975.4 397.2	32 02 20 112 10 52 112 59 20	212 01 31 292 09 17 292 57 47	Slue..... Knight..... H 30 ₁ (U. S. E.).....	2753.3 3075.8 3031.6	3.439854 3.487962 3.481679
Catholic Church, cross, Kalama, 1913.	46 00 33.743 122 50 20.400	1041.8 438.8	30 35 21 111 18 35 112 07 18	210 34 33 291 17 01 292 05 47	Slue..... Knight..... H 30 ₁ (U. S. E.).....	2788.4 3012.5 2967.8	3.445359 3.478933 3.472433
Church, Kalama, star, ¹ 1913.....	46 00 38.98 122 50 34.60	1203.6 744.3	23 29 13 110 27 11	203 28 36 290 25 48	Slue..... Knight.....	2793.7 2669.5	3.446184 3.426428
New Range, rear light, 1913.....	45 59 04.435 122 51 14.566	136.9 313.5	144 38 54 197 52 54 211 55 30	324 38 46 17 53 20 31 56 01	Slue..... Kalama..... H 23 ₁ (U. S. E.).....	437.5 2472.5 1743.4	2.641023 3.393141 3.241385
New Range, front light, 1913.....	45 59 17.519 122 51 23.785	540.9 512.0	49 18 02 206 09 48 226 09 45	229 17 59 26 10 20 46 10 22	Slue..... Kalama..... H 23 ₁ (U. S. E.).....	72.2 2171.7 1553.1	1.858622 3.336792 3.191208
Barn, gable, 1913.....	45 59 05.236 122 51 25.574	161.7 550.5	203 09 34 218 32 03 255 34 24	23 10 08 38 32 42 75 35 22	Kalama..... H 23 ₁ (U. S. E.)..... H 21 (U. S. E.).....	2194.6 1860.0 1776.9	3.341350 3.269511 3.249658
White house, terra cotta pipe, 1913...	45 59 25.636 122 51 48.895	791.5 1052.5	221 24 21 253 41 47 301 30 28	41 25 11 73 42 49 121 30 44	Kalama..... Rock..... Slue.....	2264.7 1942.6 569.7	3.355006 3.288377 2.753644
Tank, large black, oil, 1913.....	45 59 44.417 122 52 03.000	1371.4 64.5	238 09 17 270 54 35 318 01 54	58 10 17 90 55 48 138 02 20	Kalama..... Rock..... Slue.....	2120.5 2168.3 1180.3	3.326436 3.336112 3.071989
Light on dolphin, 1913.....	45 59 49.280 122 51 44.269	1521.5 952.5	235 17 24 266 30 41 330 24 28	55 18 10 86 31 33 159 24 41	Kalama..... H 23 ₁ (U. S. E.)..... Slue.....	1701.0 1564.0 1097.9	3.230704 3.194234 3.040555
Enterprise landing, front light, 1913..	46 00 05.854 122 52 21.364	180.7 459.7	258 14 37 296 03 18 316 03 50	78 15 51 116 04 56 136 05 10	Kalama..... H 21 (U. S. E.)..... Flat.....	2243.5 3252.1 3450.5	3.350921 3.512168 3.537884
Large tree, top out, 1913.....	45 57 57.001 122 48 40.564	1759.8 873.4	343 21 04 109 04 42 133 40 01	163 21 26 289 03 50 313 39 50	Martin 3 (U. S. E.)..... H 22 (U. S. E.)..... Hill.....	2223.3 1661.9 490.2	3.346989 3.220597 2.690367

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
Bluff (U. S. E.), 1913.....	45 57 38.021	1173.9	42 59 14.3	222 58 36.9	Connel 2 (U. S. E.).....	1041.8	3.215319
	122 48 25.367	546.3	94 12 41.6	274 11 42.3	H 20 (U. S. E.).....	1780.2	3.250471
			343 38 31.7	168 38 45.0	Martin 3 (U. S. E.).....	1579.9	3.198634
Bend (U. S. E.), 1913.....	45 57 43.218	1334.4	174 59 48.5	354 59 44.6	H 19 (U. S. E.).....	1344.2	3.128473
	122 49 21.169	455.8	214 13 23.0	34 13 40.4	Hill (U. S. E.).....	924.0	2.965666
			277 36 04.4	97 36 44.6	Bluff (U. S. E.).....	1212.3	3.083596
			318 29 06.5	138 29 57.1	Martin 3 (U. S. E.).....	2282.7	3.358456
Day mark on tree, Bybee Landing, 1913.	45 58 13.561	418.7	91 40 58	271 40 22	H 22 (U. S. E.).....	1082.7	3.034519
	122 49 03.246	69.9	117 42 02	297 41 00	Flat (U. S. E.).....	2112.7	3.324844
			322 15 51	142 15 57	Hill (U. S. E.).....	218.6	2.339558
Hoffman Landing light, June, 1913....	45 58 38.514	1189.1	19 22 25	199 22 16	H 22 (U. S. E.).....	783.0	2.893789
	122 49 41.450	892.4	101 24 27	281 23 52	Flat (U. S. E.).....	1069.3	3.029114
			117 08 59	297 07 43	Slue (U. S. E.).....	2536.8	3.404293
H 24 (U. S. E.), 1913.....	45 58 38.511	1189.0	131 21 47.9	311 21 03.9	Slue (U. S. E.).....	1751.4	3.243393
	122 50 25.253	543.6	198 26 22.2	18 26 36.3	H 21 (U. S. E.).....	1336.2	3.125870
			286 14 56.8	106 15 38.9	H 19 (U. S. E.).....	1314.9	3.118898
			317 13 31.4	137 13 54.2	H 22 (U. S. E.).....	1006.2	3.002694
Chimney, white house, ¹ 1913.....	45 58 58.341	1801.3	63 42 26	243 41 59	Flat (U. S. E.).....	904.6	2.956469
	122 49 52.466	1129.3	105 06 24	285 05 16	Slue (U. S. E.).....	2092.5	3.320664
Front chimney, white house, H. and R. Duck Club, 1913.	45 49 28.632	884.0	219 58 19	39 58 55	Ten (U. S. E.).....	1701.7	3.230881
	122 47 52.185	1126.5	320 51 12	140 52 45	Six (U. S. E.).....	1683.7	3.226277
			338 48 32	158 48 33	Nine (U. S. E.).....	47.2	1.674070
Peninsula Lumber Co., black tank, 1913.	45 54 05.636	174.0	64 25 59	27 26 27	H 11 (U. S. E.).....	1812.5	3.258289
	122 48 43.946	947.3	227 24 51	47 25 16	H 9 ₂ (U. S. E.).....	1021.6	3.009266
			260 33 59	80 34 28	H 7 ₂ (U. S. E.).....	892.9	2.950824
Day mark on dolphin, 1913.....	45 55 58.074	1820.8	9 31 22	189 31 11	H 11 (U. S. E.).....	1916.9	3.282609
	122 47 50.479	1087.5	75 59 13	255 58 19	H 16 ₂ (U. S. E.).....	1673.4	3.223607
			134 47 23	314 46 20	Connel 2 (U. S. E.).....	2636.1	3.420968
White house, near wharf, north chimney, 1913.	45 53 32.655	1008.2	187 45 46	7 45 58	H 11 (U. S. E.).....	2651.2	3.423449
	122 48 21.814	470.4	199 07 24	19 07 38	H 7 ₂ (U. S. E.).....	1232.6	3.090819
			295 19 49	115 20 46	H 5 ₂ (U. S. E.).....	1904.0	3.279664
Dark Pile, day mark, 1913.....	45 57 20.523	633.6	64 28 35	244 27 49	Connel 2 (U. S. E.).....	1533.3	3.185632
	122 48 13.098	282.1	127 40 44	307 39 32	H 22 (U. S. E.).....	2731.3	3.436376
			146 34 25	326 34 08	Martins Bluff.....	921.9	2.964671
Deer Island Jetty light, July, 1913....	45 55 51.209	1581.1	67 56 37	247 56 23	H 16 ₂ (U. S. E.).....	441.0	2.644481
	122 48 46.864	1009.6	203 52 37	23 53 03	Martin 3 (U. S. E.).....	1912.5	3.281602
			289 00 32	109 01 14	H 13 ₂ (U. S. E.).....	1353.6	3.131476
Old Barn, gable, 1913.....	45 56 55.223	1705.0	179 13 01	359 13 01	Connel 2 (U. S. E.).....	120.3	2.080289
	122 49 17.266	371.9	209 24 19	29 24 48	Martins Bluff.....	1779.9	3.250387
			279 02 37	99 03 24	Martin 3 (U. S. E.).....	1447.0	3.160457
Bybee Landing light, July, 1913.....	45 58 06.098	188.3	102 27 16	282 26 36	H 22 (U. S. E.).....	1216.0	3.084927
	122 48 58.364	1256.6	121 32 22	301 31 16	Flat (U. S. E.).....	2318.1	3.365134
			206 27 05	26 27 06	Hill (U. S. E.).....	643.1	2.808250
Old Orchard, 1878.....	45 55 45.618	1408.4	193 47 16.4	13 47 46.7	Martins Bluff.....	3809.4	3.580855
	122 49 18.846	406.0	266 33 24.9	86 36 15.3	Burnt Hill.....	5117.9	3.709089
			344 23 08.4	164 23 39.6	Adams.....	3483.0	3.541950
Maxwell, 1878.....	45 54 07.545	232.9	64 45 53.4	244 45 30.3	Adams.....	765.8	2.884132
	122 48 03.223	69.5	151 43 01.7	331 42 07.3	Old Orchard.....	3438.7	3.536394
Old house, yellow terra-cotta chimney, 1913.	45 52 21.149	653.0	18 44 16	198 43 47	Warrior (U. S. E.).....	2751.2	3.439519
	122 46 37.231	802.9	32 24 07	212 23 30	H 4 (U. S. E.).....	2107.0	3.323665
			3 33 01	183 33 01	H 3 (U. S. E.).....	501.2	2.699998
St. Helens Bar front range light, July, 1913.	45 53 17.104	528.1	191 50 10	11 50 21	H 7 ₂ (U. S. E.).....	1680.4	3.225415
	122 48 19.072	411.2	281 22 52	101 23 47	H 5 ₂ (U. S. E.).....	1685.1	3.229198
			315 48 19	135 49 30	H 3 (U. S. E.).....	3106.7	3.492300
St. Helens Bar rear range light, July, 1913.	45 53 21.756	671.7	197 45 44	17 46 00	H 7 ₂ (U. S. E.).....	1576.2	3.197618
	122 48 25.388	547.4	303 48 13	104 54 22	H 5 ₂ (U. S. E.).....	1860.5	3.269622
			315 50 37	135 52 03	H 3 (U. S. E.).....	3304.6	3.519121
Columbia City front range light, July, 1913.	45 53 46.743	1443.2	216 56 44	36 57 02	H 7 ₂ (U. S. E.).....	912.9	2.960440
	122 48 28.537	615.2	303 48 31	123 49 33	H 5 ₂ (U. S. E.).....	2245.6	3.351338
			337 18 09	157 18 15	H 8 ₂ (U. S. E.).....	458.3	2.661123
Columbia City rear range light, July, 1913.	45 53 39.159	1209.0	196 02 45	16 02 59	H 9 ₂ (U. S. E.).....	1509.9	3.195867
	122 48 29.182	629.2	210 16 29	30 16 48	H 7 ₂ (U. S. E.).....	1116.0	3.047658
			298 22 31	118 23 33	H 5 ₂ (U. S. E.).....	2136.5	3.329699
Unpainted house, stovepipe, 1913.....	45 54 29.175	900.8	7 34 40	187 34 32	H 8 ₂ (U. S. E.).....	1748.1	3.242567
	122 48 09.644	207.9	38 12 36	218 12 16	Dock (U. S. E.).....	960.5	2.982513
			340 11 25	160 11 27	H 9 ₂ (U. S. E.).....	37.7	1.576892
White house, chimney, back, 1913....	45 54 21.474	663.0	9 19 21	189 19 13	H 8 ₂ (U. S. E.).....	1515.1	3.180439
	122 48 08.952	193.0	49 40 27	229 40 07	Dock (U. S. E.).....	798.9	2.902480
			179 23 57	359 23 57	H 9 ₂ (U. S. E.).....	202.3	2.305912

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
	° ' "		° ' "	° ' "		Meters.	
Adams, 1878.....	45 53 56.969 122 48 35.358	1758.9 762.2	228 43 45.1 282 23 29.4	48 46 04.2 102 27 24.1	Burnt Hill..... Lewis River Hill.....	5550.4 7217.1	3.744326 3.858360
Carruthers, 1878.....	45 53 07.316 122 47 01.202	225.9 90.6	127 57 51.4 145 37 21.6 203 01 55.2	307 56 45.9 325 36 39.2 23 03 08.8	Adams..... Maxwell..... Burnt Hill.....	2492.5 5643.0 5643.0	3.396636 3.352806 3.751508
Rock crusher, southeast stack, 1913...	45 52 19.013 122 47 54.742	587.0 1180.7	217 55 59 284 49 01 323 47 58	37 56 37 104 49 55 143 48 46	H 5 ₂ (U. S. E.)..... H 3 (U. S. E.)..... H 1 ₂ (U. S. E.).....	1849.7 1697.3 2442.5	3.267105 3.229754 3.387829
St. Helens Jetty light, July, 1913.....	45 52 24.726 122 47 04.138	763.4 89.2	101 47 30 182 03 10 318 01 17	281 46 52 2 03 11 138 01 35	H 6 ₂ (U. S. E.)..... H 5 ₂ (U. S. E.)..... H 3 (U. S. E.).....	1146.4 1283.3 821.4	3.059333 3.108320 2.914544
Lemont, 1878.....	45 52 26.352 122 47 55.823	813.6 1203.9	177 04 38.4 207 12 19.6 221 20 53.6 258 36 41.2	357 04 33.1 27 14 10.2 41 21 30.7 78 40 07.5	Maxwell..... Burnt Hill..... Carruthers..... Lewis River Hills.....	3128.4 7261.8 1684.9 6320.9	3.495318 3.861042 3.226570 3.800778
Balsam, 1878.....	45 52 16.844 122 46 38.845	520.1 837.8	100 02 03.9 160 39 56.7	280 01 08.6 340 39 38.5	Lemont..... Carruthers.....	1686.0 1651.5	3.226854 3.217869
St. Helens Congregational Church, 1913.	45 51 59.154 122 47 55.272	1826.3 1192.2	209 00 01 263 48 50 313 02 24	29 00 39 83 49 45 133 03 13	H 5 ₂ (U. S. E.)..... H 3 (U. S. E.)..... H 1 ₂ (U. S. E.).....	2369.1 1662.0 1989.4	3.374585 3.220633 3.298733
St. Helens new courthouse, dome, 1913.	45 51 49.608 122 47 45.781	1531.6 987.6	251 52 34 310 23 54 336 30 55	71 53 23 130 24 35 156 31 07	H 3 (U. S. E.)..... H 1 ₂ (U. S. E.)..... H 4 (U. S. E.).....	1523.1 1640.4 877.9	3.182737 3.214938 2.943448
St. Helens School, small cupola, 1913.	45 51 49.749 122 47 56.413	1536.0 1217.0	206 24 30 254 21 35 324 24 54	26 25 10 74 22 31 144 25 14	H 5 ₂ (U. S. E.)..... H 3 (U. S. E.)..... H 4 (U. S. E.).....	2637.7 1741.4 995.5	3.421225 3.240899 2.998020
United Wireless Co., pole, 1913.....	45 51 46.867 122 48 23.817	1447.0 513.8	256 09 45 295 17 53 319 11 43	76 11 01 115 19 02 139 12 46	H 3 (U. S. E.)..... H 1 ₂ (U. S. E.)..... Lake (U. S. E.).....	2335.7 2289.4 2891.5	3.368422 3.359716 3.461126
St. Helen's Church, 1878	45 51 44.766 122 47 53.298	1382.1 1149.7	202 52 08.4 238 19 49.4 247 35 47.0 299 22 59.6 307 06 47.1	22 53 57.0 58 20 42.8 67 39 11.2 119 23 46.1 127 09 20.9	Burnt Hill..... Balsam..... Lewis River Hills..... Russell..... Reed.....	8402.8 1886.8 6643.4 1604.1 5812.1	3.924423 3.275717 3.822392 3.205238 3.764331
St. Helens Lumber Co., pole near gable of mill, 1913.	45 51 39.292 122 47 42.036	1213.1 906.9	239 54 04 302 30 36 331 04 03	59 54 50 122 31 15 151 04 12	H 3 (U. S. E.)..... H 1 ₂ (U. S. E.)..... H 4 (U. S. E.).....	1579.8 1385.5 556.1	3.198599 3.141618 2.745177
Russell, 1878.....	45 51 19.269 122 46 48.509	594.9 1046.4	40 35 54.0 144 58 25.4 186 41 16.5	220 35 34.3 324 57 36.9 6 41 23.4	Warriors Point..... Lemont..... Balsam.....	908.7 2529.4 1789.8	2.958424 3.403020 3.252800
Warriors Point, 1878.....	45 50 56.920 122 47 15.916	1757.4 343.4	162 41 14.7 183 35 24.0 197 57 10.6	342 40 46.0 3 35 32.4 17 57 37.2	Lemont..... Carruthers..... Balsam.....	2892.2 4033.8 2594.0	3.461233 3.605716 3.413962
Lake River, 1878.....	45 50 43.802 122 46 50.783	1352.4 1095.8	126 45 23.4 156 06 21.5 176 15 49.6 182 33 54.3	306 45 05.4 336 05 34.6 356 15 39.8 2 33 55.9	Warriors Point..... Lemont..... Carruthers..... Russell.....	676.8 3463.1 4440.4 1096.1	2.830492 3.539468 3.647418 3.039855
Warrior Rock Lighthouse, ventilator, August, 1913.	45 50 56.806 122 47 15.240	1753.8 328.8	226 09 15 327 30 33 348 12 53	46 09 35 147 30 47 168 13 04	H 1 ₂ (U. S. E.)..... Lake (U. S. E.)..... Ten (U. S. E.).....	818.5 762.8 1448.8	2.913003 2.882400 3.161000
St. Helens Lumber Co., north stack, 1913.	45 51 37.956 122 47 42.159	1171.9 909.5	238 40 26 300 59 29 328 37 13	58 41 12 121 00 08 148 37 22	H 3 (U. S. E.)..... H 1 ₂ (U. S. E.)..... H 4 (U. S. E.).....	1603.1 1366.1 521.8	3.204973 3.135484 2.717513
Henric Landing rear range light, August, 1913.	45 48 53.726 122 47 55.234	1658.8 1192.5	345 15 35 281 26 31 343 23 31	165 15 37 101 27 08 163 23 59	Seven 2 (U. S. E.)..... Six (U. S. E.)..... D (U. S. E.).....	220.7 1151.3 3004.9	2.343791 3.061186 3.477835
Henric Landing front range light, August, 1913.	45 48 48.159 122 47 50.434	1486.9 1088.9	48 47 24 273 09 30 344 24 56	228 47 22 93 10 04 164 25 21	Seven 2 (U. S. E.)..... Six (U. S. E.)..... D (U. S. E.).....	63.1 1026.3 2811.1	1.800033 3.011295 3.448873
Powder House, low stack, 1913.....	45 48 52.674 122 47 54.591	1626.3 1178.5	346 50 02 279 58 04 324 40 56	166 50 03 99 58 41 144 41 59	Seven 2 (U. S. E.)..... Six (U. S. E.)..... A (U. S. E.).....	185.8 1131.7 3251.4	2.269077 3.053720 3.512064
Shobert, 1881.....	45 48 53.944 122 44 44.358	1665.5 957.7	358 05 30.4 40 46 31.5 62 41 54.8 141 30 24.5	178 05 35.7 220 40 54.4 242 35 34.0 321 27 27.9	Fales..... Bouser..... Scappoose..... Table Cliff.....	4763.0 15586.7 12920.7 8525.6	3.677880 4.192753 4.111286 3.930724
Ladd, 1881.....	45 49 19.75 122 46 16.37	609.8 353.4	249 08 24 338 52 38	69 09 49 158 53 50	Reed..... Fales.....	2721.2 5957.1	3.434766 3.775036
Meadows, 1881.....	45 47 48.060 122 48 06.110	1483.8 132.0	30 45 01.2 61 18 02.9	210 41 48.6 241 14 06.7	Bouser..... Scappoose.....	11374.0 8118.8	4.055914 3.909492

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga- rithm.
<i>Supplementary points—Continued.</i>							
Four 2 (U. S. E.), 1913.....	45 48 16.712	516.0	355 16 36.2	175 16 38.2	Two (U. S. E.).....	Meters. 723.3	2.859295
	122 46 40.634	877.5	63 43 59.1	243 43 15.4	One 2 (U. S. E.).....	1462.5	3.165082
			96 18 53.9	276 18 05.0	Five 2 (U. S. E.).....	1483.5	3.171297
Abrams, 1881.....	45 47 48.779	1506.0	47 28 54.5	227 23 01.0	Bouser.....	14486.9	4.160977
	122 44 21.325	460.5	71 54 29.2	251 47 52.0	Scappoose.....	12602.2	4.100447
			146 14 59.7	326 11 46.7	Table Cliff.....	10445.6	4.018933
Batchelors Point Light, August, 1913..	45 47 18.409	568.4	13 41 35	193 41 25	Dead Willow (U. S. E.).....	1251.9	3.097562
	122 46 22.706	490.4	57 46 24	237 45 58	E (U. S. E.).....	921.9	2.964896
			93 10 25	273 09 47	D (U. S. E.).....	1141.5	3.057470
Fales's House, red chimney, 1881.....	45 46 10.564	326.2	56 39 30.9	236 33 50.8	Bouser.....	12297.5	4.089818
	122 44 40.015	864.6	85 38 33.8	265 32 10.0	Scappoose.....	11608.8	4.064786
			183 53 26.6	3 53 42.0	Reed.....	6825.3	3.834122
Nelson, 1881.....	45 45 52.247	1613.1	35 00 07.7	214 57 48.0	Bouser.....	7569.6	3.879073
	122 49 14.231	307.5	86 42 38.6	266 39 31.3	Scappoose.....	5658.6	3.752710
Cloniger, ¹ 1881.....	45 44 53.58	1654.2	35 39 38	215 37 54	Bouser.....	5402.9	3.732625
	122 50 09.35	202.1	108 25 55	288 23 27	Scappoose.....	4699.3	3.672032
Knapp, 1881.....	45 44 20.027	618.3	308 01 13.8	128 02 16.0	Brookside.....	2384.3	3.377369
	122 45 16.734	361.8	11 44 57.8	191 43 16.0	Willamet.....	15151.5	4.180457
			70 32 57.8	250 27 44.0	Bouser.....	10053.0	4.002294
Knapp's chimney, 1881.....	45 44 16.700	515.6	103 12 08.9	283 06 11.5	Scappoose.....	11074.4	4.044321
	122 43 58.807	1271.4	17 57 27.0	197 54 49.4	Willamet.....	15484.6	4.189901
			73 48 27.9	233 42 18.3	Bouser.....	11626.1	4.065434
Sheringhausen, ¹ 1878.....	45 44 08.50	262.4	101 56 10.3	281 49 17.0	Scappoose.....	12741.2	4.105212
	122 51 07.01	151.6	32 18 00	212 16 57	Bouser.....	3560.4	3.551494
			131 44 23	311 42 36	Scappoose.....	4304.7	3.633947
Brookside, 1881.....	45 43 32.449	1001.9	20 23 28.8	200 20 44.9	Willamet.....	14257.4	4.154041
	122 43 49.870	1078.5	80 37 24.8	260 31 08.9	Bouser.....	11512.0	4.061150
			107 32 34.6	287 25 35.0	Scappoose.....	13276.3	4.123078
Oak Ridge, ¹ 1881.....	45 43 10.79	333.1	74 10 41	254 08 19	Bouser.....	4458.9	3.649225
	122 49 16.64	359.9	129 46 46	309 43 40	Scappoose.....	7283.3	3.862328
Harris, 1881.....	45 42 27.172	838.9	13 45 16.6	193 43 45.0	Willamet.....	11685.1	4.067632
	122 45 30.902	668.4	90 51 02.1	270 45 58.6	Bouser.....	9173.8	3.962549
			119 51 21.8	299 45 34.7	Scappoose.....	12078.6	4.082018
Morgan, 1881.....	45 40 47.068	1453.2	112 41 10.0	292 36 54.8	Bouser.....	8361.2	3.922271
	122 46 38.325	829.4	195 01 03.2	15 02 01.6	Knapp.....	6807.6	3.832991
			9 03 37.4	189 02 54.3	Willamet.....	8364.2	3.922427
Hendrickson, ¹ 1881.....	45 39 32.79	1012.4	28 12 53	208 11 08	Willamet.....	6770.4	3.830616
	122 45 11.40	246.8	140 38 23	320 37 21	Morgan.....	2966.4	3.472226
Howell house, east chimney, 1881.....	45 38 29.738	918.1	13 34 30.0	193 33 58.0	Willamet.....	4135.7	3.616546
	122 46 54.314	1176.3	135 22 10.7	315 18 07.0	Bouser.....	10418.5	4.020714
			244 07 55.0	44 08 01.8	Howell.....	293.7	2.467898
Hillside, ¹ 1883.....	45 37 54.92	1695.5	249 38 13	69 40 08	Howell.....	3698.1	3.567974
	122 49 24.96	540.5	316 41 33	136 42 35	Quigley.....	2748.2	3.439051
Quigley, 1883.....	45 36 50.132	1547.7	205 43 11.0	25 44 03.2	Howell.....	3647.5	3.561999
	122 47 57.965	1255.9	274 53 57.9	94 55 22.1	Gatton.....	2564.0	3.408910
House, west gable, 1883.....	45 36 07.175	221.5	2 20 36.5	182 20 33.9	Springville.....	1950.6	3.290161
	122 46 06.322	137.0	46 39 07.2	226 38 37.2	Watts.....	1252.3	3.097713
			99 26 11.3	279 25 17.1	Kaiser.....	1663.8	3.221104
Gatton's house, chimney, 1883.....	45 35 57.370	1771.2	8 00 00.0	187 59 52.4	Springville.....	1662.4	3.220732
	122 45 59.329	1285.7	62 20 04.9	242 19 29.9	Watts.....	1199.4	3.078954
			107 47 53.0	287 46 53.8	Kaiser.....	1883.0	3.274842
Thistle, ¹ 1883.....	45 34 12.57	388.2	199 23 10	19 23 26	Caples.....	1445.2	3.159938
	122 45 13.13	284.7	263 15 45	83 16 45	Waud.....	1820.8	3.260251
Mann, ¹ 1883.....	45 33 44.65	1378.6	171 05 23	351 05 11	Caples.....	2252.4	3.352643
	122 44 34.90	757.1	222 19 40	42 20 12	Waud.....	1454.5	3.162722
Portland Episcopal Church, spire, 1883.	45 31 20.207	623.8	101 57 21.3	281 56 14.9	King.....	2064.5	3.314805
	122 40 33.616	729.5	187 56 15.0	7 52 22.4	Montgomery.....	1651.0	3.217746
			332 49 18.7	152 50 02.5	Tibbets.....	2316.9	3.464924
Portland customhouse, dome, 1882-3.	45 31 08.661	267.4	24 01 09.5	204 00 41.0	Hoffmans Hill.....	1909.5	3.280921
	122 40 38.680	839.5	112 19 18.1	292 18 15.3	King.....	2064.5	3.314808
			189 34 25.5	9 34 36.5	Montgomery.....	2040.0	3.305366
Portland Methodist Church, spire, 1883.	45 31 02.066	63.8	327 12 16.6	147 13 04.0	Tibbets.....	2662.8	3.423339
	122 40 30.984	672.5	25 40 54.4	205 40 32.5	Hoffmans Hill.....	1539.8	3.187469
			115 26 10.0	295 25 01.7	King.....	2299.7	3.361673
		184 24 04.4	4 24 09.9	Montgomery.....	2302.0	3.342813	
		327 55 32.0	147 56 13.9	Tibbets.....	2401.4	3.380467	
		35 10 15.0	215 09 47.6	Hoffmans Hill.....	1448.6	3.160934	

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azlmuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Supplementary points—Continued.</i>							
Portland courthouse dome, 1883.....	45 31 00.464 122 40 38.812	14.3 842.4	118 32 29.6 188 34 57.4 323 56 54.9 30 21 12.7	298 31 26.9 8 35 08.5 143 57 42.4 210 20 50.9	King..... Montgomery..... Tibbets..... Hoffmans Hill.....	Meters. 2170.7 2270.4 2455.6 1314.9	3.336603 3.356102 3.390155 3.118888
Portland Congregational Church spire, 1883.	45 30 52.994 122 40 33.405	1636.1 725.0	122 03 32.8 185 06 47.1 322 53 11.9 40 51 15.3	302 02 26.2 5 06 54.3 142 53 55.5 220 50 49.6	King..... Montgomery..... Tibbets..... Hoffmans Hill.....	2388.5 2485.5 2200.5 1195.2	3.378124 3.395406 3.342513 3.077447
Portland Waterworks, pumping tower, 1883.	45 30 24.228 122 40 12.308	748.0 267.2	314 54 10.9 11 15 56.3 89 15 54.6	134 54 39.4 191 15 46.5 269 15 13.8	Tibbets..... Homestead..... Hoffmans Hill.....	1227.9 1523.0 1239.9	3.089150 3.182705 3.093392
Homestead, 1883.....	45 29 35.846 122 40 26.010	1106.7 564.8	147 28 27.3 241 45 26.6	327 27 56.3 61 46 04.9	Hoffmans Hill..... Tibbets.....	1752.6 1324.9	3.243690 3.122195
Large white house, chimney, ¹ August, 1913.	45 45 46.17 122 44 41.00	1425.5 886.2	106 12 50 117 25 03	286 12 14 297 23 51	Fales..... Grassy.....	1113.5 2440.0	3.046802 3.387387
Fales Landing light, 1913.....	45 45 49.079 122 45 28.955	1515.3 625.9	171 26 32	351 26 31	Fales.....	223.5	2.349277
Windmill, on unpainted tower, 1913..	45 44 56.226 122 40 18.526	1735.9 400.4	294 00 31 3 55 58	114 01 09 183 55 58	W 9 (U. S. E.)..... W 14 (U. S. E.).....	1250.2 125.9	3.096990 2.099925
Red mill, spindle, 1913.....	45 44 24.239 122 46 23.097	748.4 499.4	248 53 51 285 12 17 314 52 21	68 54 32 105 13 07 134 53 08	W 9 (U. S. E.)..... W 7 ₂ (U. S. E.)..... Range 2 (U. S. E.).....	1330.1 1563.4 2093.2	3.123878 3.194074 3.320815
Red house, chimney, 1913.....	45 44 18.835 122 40 23.151	581.5 500.5	242 31 55 279 09 03 332 46 01	62 32 36 99 09 53 152 46 41	W 9 (U. S. E.)..... W 7 ₂ (U. S. E.)..... W 5 ₂ (U. S. E.).....	1399.9 1529.3 2665.8	3.146086 3.184501 3.425826
Yellow house, south chimney, 1913...	45 44 16.215 122 46 23.592	500.6 510.1	239 51 47 278 05 51 309 26 29	59 52 28 96 06 41 129 27 16	W 9 (U. S. E.)..... W 7 ₂ (U. S. E.)..... Range 2 (U. S. E.).....	1447.2 1528.0 1934.7	3.160533 3.184136 3.286621
Old windmill, high tank, 1913.....	45 43 50.781 122 46 20.494	1567.8 443.1	246 47 01 287 16 55 322 18 38	66 47 49 107 17 41 142 19 16	W 7 ₂ (U. S. E.)..... Range 2 (U. S. E.)..... W 5 ₂ (U. S. E.).....	1580.1 1494.3 1900.8	3.198678 3.174447 3.278946
East silo, 1913.....	45 43 34.329 122 46 20.234	1059.9 437.5	231 59 20 267 25 19 310 44 09	52 00 08 87 26 05 130 44 47	W 7 ₂ (U. S. E.)..... Range 2 (U. S. E.)..... W 5 ₂ (U. S. E.).....	1836.3 1423.0 1526.7	3.263940 3.153196 3.183748
White house, middle chimney, 1913..	45 43 33.274 122 46 17.625	1027.3 381.1	265 57 14 311 12 45 18 47 16	85 57 59 131 13 21 198 47 14	Range 2 (U. S. E.)..... W 5 ₂ (U. S. E.)..... W 10 ₂ (U. S. E.).....	1368.5 1462.7 180.7	3.136251 3.165159 2.257017
Upper Willow Bar range, front light, August, 1913.	45 43 36.259 122 45 14.431	1119.5 312.0	162 05	342 05	Range 2 (U. S. E.).....	4.51	0.65417
Upper Willow Bar range, rear light, August, 1913.	45 43 38.813 122 45 12.400	1198.3 268.1	31 17	211 17	Range 2 (U. S. E.).....	87.25	1.94077
Lower Willow Bar range, front light, August, 1913.	45 43 08.614 122 45 25.958	265.9 561.4	4 48 54 45 15 06	184 48 53 225 14 30	W 5 ₂ (U. S. E.)..... W 6 (U. S. E.).....	203.2 1512.3	2.307966 3.179626
Lower Willow Bar range, rear light, August, 1913.	45 43 03.248 122 45 25.970	100.3 561.7	24 30 12 50 03 48	204 30 11 230 03 12	W 5 ₂ (U. S. E.)..... W 6 (U. S. E.).....	40.5 1400.4	1.607455 3.146249
Reeder's house, north chimney, ¹ 1913.	45 43 00.35 122 46 16.22	10.8 350.8	211 57 34 230 10 27	31 58 19 50 11 11	W 7 ₂ (U. S. E.)..... Range 2 (U. S. E.).....	2509.3 1737.9	3.409818 3.240031
Old church belfry, front spindle, 1913.	45 43 05.985 122 46 15.305	184.8 331.0	170 49 58 213 44 57 276 35 00	350 49 54 33 45 40 96 35 34	W 10 ₂ (U. S. E.)..... W 7 ₂ (U. S. E.)..... W 5 ₂ (U. S. E.).....	690.1 2412.4 1057.2	2.832580 3.382451 3.024146
New house, chimney, 1913.....	45 42 41.213 122 46 16.047	1272.4 347.1	206 04 57 217 59 46 238 53 09	26 05 42 38 00 29 58 53 44	W 7 ₂ (U. S. E.)..... Range 2 (U. S. E.)..... W 5 ₂ (U. S. E.).....	3084.8 2162.1 1245.4	3.489226 3.334873 3.095316
Reeder Point light, August, 1913.....	45 42 03.213 122 46 25.046	99.2 541.8	180 13 32 288 32 07	0 13 32 108 32 42	W 4 ₂ (U. S. E.)..... W 3 (U. S. E.).....	89.0 1120.9	1.949390 3.049350
Morgan Wharf light, September, 1913.	45 40 39.929 122 46 34.567	1232.8 748.1	292 49 07 308 33 23 345 21 38	112 49 42 128 34 09 165 21 45	One 3 (U. S. E.)..... Middle..... Two 2 (U. S. E.).....	1156.3 1790.3 831.2	3.063067 3.252932 2.919706
High tank, remains of windmill, 1913.	45 40 40.119 122 46 36.456	1238.6 788.9	292 19 02 307 54 00 342 47 11	112 19 39 127 54 48 162 47 19	One 3 (U. S. E.)..... Middle..... Two 2 (U. S. E.).....	1196.3 1826.1 848.1	3.077840 3.261518 2.928426
Mountain View Dairy Farm, wind-mill on barn, 1913.	45 40 13.721 122 45 34.824	423.6 753.8	340 48 49 90 15 53 147 46 37	160 48 53 270 15 17 327 46 29	Middle..... Two 2 (U. S. E.)..... One 3 (U. S. E.).....	325.0 1083.1 426.3	2.511829 3.034668 2.629684
Schoolhouse, belfry, 1913.....	45 40 02.165 122 45 25.453	66.8 551.0	342 09 48 165 42 54 117 37 06	162 09 52 285 42 11 297 38 03	Three 3 (U. S. E.)..... Two 2 (U. S. E.)..... Middle.....	420.9 1335.9 108.3	2.624166 3.125770 2.034754

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Supplementary points—Continued.</i>							
Windmill, white tank, 1913.....	45 39 53.685 122 45 22.710	1657.5 491.6	45 56 36 114 52 12 153 29 21	225 56 10 294 51 28 333 29 16	Four 2 (U. S. E.)..... Two 2 (U. S. E.)..... Middle.....	Meters 1102.7 1482.8 348.3	3.042473 3.171096 2.541932
Coon Island Light, October, 1913.....	45 39 19.179 122 46 00.241	592.1 5.2	205 30 20 356 03 28 16 27 57	25 30 41 176 03 30 196 27 39	Middle..... Mud..... Pen.....	1525.7 828.9 1904.9	3.183465 2.950316 3.279883
Willamette River range front light, October, 1913.	45 39 08.224 122 45 46.754	253.9 1012.4	72 41 25 155 53 37 205 00 43	252 41 02 335 53 26 25 01 03	School..... End..... Three 3 (U. S. E.).....	723.4 828.9 1395.5	2.859385 2.918509 3.144733
Day mark, October, 1913.....	45 38 45.897 122 46 00.776	1417.0 16.8	140 46 13 178 36 49 207 53 24	320 46 00 358 36 48 27 53 26	School..... End..... Mud.....	612.0 1446.4 155.8	2.786739 3.160276 2.192623
Gillihan tank, white, 1913.....	45 38 47.527 122 46 28.611	1467.3 617.3	46 18 58 206 44 31 262 36 07	226 18 46 26 44 38 82 36 27	Howell..... School..... Mud.....	489.9 474.5 679.1	2.690095 2.676217 2.831943
Three Tree Island Shoal Light, October, 1913.	45 38 34.379 122 46 28.081	1061.4 608.0	351 55 27 100 31 26 233 23 89	171 55 29 280 31 14 53 24 00	Pen..... Howell..... Mud.....	448.2 369.8 827.3	2.651471 2.567982 2.917674
Post Office Bar lower light, October, 1913.	45 38 11.574 122 47 23.340	357.3 505.5	326 34 22 351 29 25 358 54 04	146 35 22 171 29 32 178 54 06	Gatton..... Sand..... Linton.....	3275.4 1349.3 3991.8	3.515263 3.130099 3.601172
Post Office Bar range front light, October, 1913.	45 37 50.147 122 47 35.324	1548.2 765.1	217 19 13 315 06 41 325 41 09	37 19 49 135 07 49 145 41 24	Howell..... Gatton..... Sand.....	1802.2 2924.6 814.7	3.255797 3.466070 2.910995
Post Office Bar range rear light, October, 1913.	45 37 53.329 122 47 36.381	1646.6 788.0	316 07 16 327 58 58 354 01 04	136 08 25 147 59 15 174 01 16	Gatton..... Sand..... Linton.....	3010.8 909.5 3446.6	3.478687 2.958793 3.537390
Linton Landing Light, October, 1913.	45 36 17.022 122 47 06.346	525.5 137.5	175 37 30 240 47 31 32 41 46	355 37 24 60 48 18 212 41 35	Sand..... Gatton..... Linton.....	2208.6 1645.3 540.1	3.344115 3.216245 2.732475
Vancouver Bridge, center of draw, ¹ 1913.	45 37 37.53 122 41 17.75	1158.6 384.5	69 29 32 119 26 04	249 25 14 299 22 43	Linton..... Four 2 (U. S. E.).....	8377.7 6999.6	3.923123 3.845071
Swan Island Bar upper light, ¹ 1913..	45 32 58.77 122 41 37.20	1814.4 807.0	101 02 43 169 40 00	281 02 00 349 39 52	Forty-four (U. S. E.)..... P (U. S. E.).....	1335.6 1451.1	3.125692 3.161708
Incinerator, stack, 1913.....	45 32 33.052 122 42 11.836	1020.4 256.8	122 05 44 142 07 37 192 27 26	302 04 23 322 05 43 12 27 42	Scott..... Caples..... P (U. S. E.).....	2953.2 5620.6 2275.1	3.470300 3.749784 3.357010
Swan Island Bar lower light, 1913....	45 33 33.822 122 42 08.001	1044.2 173.5	37 62 54 171 26 18 229 43 08	217 52 32 351 26 09 49 43 21	Forty-four (U. S. E.)..... T (U. S. E.)..... P (U. S. E.).....	1047.0 1751.0 534.3	3.019953 3.243284 2.727768
Swan Island Channel front light, 1913.	45 33 40.394 122 42 07.372	1247.0 159.9	32 31 68 169 49 33 250 06 26	212 31 36 349 49 24 70 06 39	Forty-four (U. S. E.)..... T (U. S. E.)..... P (U. S. E.).....	1220.8 1553.0 418.9	3.086658 3.191176 2.622154
Swan Island Channel rear light, ¹ 1913.	45 33 47.91 122 42 12.57	1479.1 272.6	280 00 25 334 03 59	100 00 42 154 04 03	P (U. S. E.)..... Swan Island Channel, front light.	514.6 288.0	2.711452 2.411535
Mocks Bottom Light, 1913.....	45 34 09.827 122 43 00.802	303.4 17.4	234 57 44 296 15 26 342 00 14	54 58 13 116 16 17 162 00 18	T (U. S. E.)..... P (U. S. E.)..... F (U. S. E.).....	1079.9 1731.3 479.4	3.033374 3.238383 2.680723
Sawmill, west stack, 1913.....	45 34 16.756 122 43 20.466	517.3 443.8	252 46 59 31 49 21 43 52 14	72 47 42 211 48 48 223 52 04	T (U. S. E.)..... Scott..... R (U. S. E.).....	1372.0 1921.8 470.8	3.137358 3.283706 2.672796
Swan Island Range front light, 1913...	45 34 06.710 122 43 48.544	206.9 1052.7	138 45 35 275 54 18 21 39 07	318 44 50 95 54 27 201 38 58	Caples..... R (U. S. E.)..... Forty (U. S. E.).....	2053.9 284.2 671.4	3.312582 2.453552 2.826998
Swan Island Range rear light, 1913...	45 34 04.628 122 43 44.985	142.9 974.4	20 58 48 30 13 02 138 19 19	200 58 32 210 12 51 318 18 32	Scott..... Forty (U. S. E.)..... Caples.....	1347.9 647.8 2153.9	3.129662 2.811425 3.333229
Union Oil Co., white tank, knob, 1913.	45 33 46.334 122 44 26.645	1430.4 577.8	166 20 49 243 53 13 328 40 55	346 20 32 63 54 43 148 41 09	Caples..... T (U. S. E.)..... Scott.....	2236.6 3057.6 812.1	3.349590 3.485384 2.909603
Cement stack, 1913.....	45 34 30.612 122 43 56.026	945.1 1214.8	3 35 29 6 41 57 124 05 12	183 35 26 186 41 49 304 04 32	Forty (U. S. E.)..... Scott..... Caples.....	1364.6 2074.9 1439.0	3.135018 3.317003 3.168069
Peninsula Lumber Co., stack, 1913...	45 34 34.178 122 44 11.008	1055.2 238.8	350 45 41 357 48 47 228 46 20	170 45 50 177 48 50 308 45 51	Forty (U. S. E.)..... Scott..... Caples.....	1491.3 2172.4 1112.0	3.173576 3.336988 3.046123
Fairmont Gas Co., stack, 1913.....	45 34 45.826 122 45 40.093	1414.8 869.3	252 26 30 290 32 04 234 35 22	72 27 05 110 34 48 114 36 51	Caples..... P (U. S. E.)..... R (U. S. E.).....	1116.3 5347.1 2971.0	3.047796 3.728116 3.472901

¹ No check on this position.

Mouth of the Columbia River to Portland—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Supplementary points—Continued.</i>							
N. P. R. R. bridge light, center of draw, ¹ 1913.	45 34 38.30 122 44 47.40	1182.4 1027.7	172 11 11 302 47 26	352 11 08 122 48 17	Caples..... R (U. S. E.).....	Meters. 574.4 1854.3	2.759236 3.268186
Portland woolen mills, red tank, 1913.	45 35 20.589 122 45 38.309	635.6 830.4	316 26 32 323 42 39 331 15 21	136 28 42 143 43 49 151 16 26	Forty-four (U. S. E.)..... Forty (U. S. E.)..... Scott.....	5687.2 3603.5 4109.8	3.754900 3.556720 3.613823
Red tank on bluff, spindle, ¹ 1913.....	45 34 31.08 122 43 23.20	959.5 503.0	24 41 28 30 05 13	204 40 57 210 04 47	Scott..... Forty (U. S. E.).....	2283.9 1590.6	3.358674 3.201561
University flagstaff, ¹ 1913.....	45 34 20.11 122 43 25.02	620.8 542.5	257 53 15 318 57 34	77 54 01 138 57 56	T (U. S. E.)..... F (U. S. E.).....	1441.5 1025.6	3.158800 3.010975
Windmill on bluff, ¹ 1913.....	45 34 32.09 122 42 32.28	990.7 699.9	22 21 33 59 20 31	202 21 18 239 19 46	F (U. S. E.)..... R (U. S. E.).....	1236.4 1593.9	3.092143 3.202448
Round barn, ¹ 1913.....	45 33 21.20 122 44 02.17	654.5 47.1	127 00 58 330 57 03	307 00 54 3 30 04	Scott..... Forty (U. S. E.).....	136.2 782.3	2.134324 3.893368
Large red tank with pole, ¹ 1913.....	45 32 44.81 122 42 00.16	1383.4 3.5	113 38 35 137 43 27	293 37 04 317 41 25	Scott..... Caples.....	3007.6 5505.8	3.478221 3.740818
Portland tall building weather vane, ¹ 1913.	45 32 00.31 122 41 53.04	9.6 1150.9	131 33 57 144 41 39	311 32 21 329 39 32	Scott..... Caples.....	3888.8 6675.6	3.589818 3.824493
White tank, inshore one of two, 1913..	45 35 12.629 122 45 01.850	389.9 40.1	321 05 44 333 13 09 340 33 08	141 07 28 153 13 53 160 33 47	Forty-four (U. S. E.)..... Forty (U. S. E.)..... Scott.....	4980.9 2978.5 3561.0	3.697308 3.473997 3.551575
St. Johns Lumber Co., inshore stack, 1913.	45 35 06.209 122 45 28.135	191.7 609.9	290 09 54 322 11 08 330 57 47	110 10 21 142 12 11 150 58 45	Caples..... Forty (U. S. E.)..... Scott.....	857.7 3118.7 3617.3	2.933314 3.493972 3.558383
St. Johns Lumber Co., tank, 1913....	45 35 07.460 122 45 26.414	230.3 572.6	315 25 45 323 07 32 331 45 00	135 27 47 143 08 34 151 45 57	Forty-four (U. S. E.)..... Forty (U. S. E.)..... Scott.....	5216.6 3124.3 3630.6	3.717388 3.494752 3.559976
Standard Oil Co., white tank, ¹ 1913..	45 33 52.20 122 44 36.08	1611.6 782.5	248 27 14 324 23 23	68 28 50 144 23 44	T (U. S. E.)..... Scott.....	3171.5 1076.1	3.501271 3.031858
St. Johns High School, ¹ 1913.....	45 35 23.15 122 45 22.16	714.7 480.4	329 08 45 336 10 30	149 09 44 156 11 24	Forty (U. S. E.)..... Scott.....	3475.7 4025.7	3.541037 3.604838
St. Johns Fire Hall, flagstaff, ¹ 1913..	45 35 22.34 122 45 17.83	689.7 386.5	330 17 08 336 16 13	150 18 04 157 17 04	Forty (U. S. E.)..... Scott.....	3406.5 3965.4	3.532312 3.598288
Crest, 1913.....	45 29 57.927 122 42 26.377	1788.3 572.6	181 51 02.5 225 04 51.6	1 51 11.3 45 06 08.2	River..... Oregonian.....	8369.9 3292.1	3.922718 3.517473
Mills, 1913.....	45 32 16.488 122 41 26.118	509.0 566.7	332 21 08.5 17 00 22.4 165 46 31.4	152 21 42.1 196 59 39.4 345 45 57.2	Oregonian..... Crest..... River.....	2205.3 4473.2 4217.1	3.343471 3.650618 3.625018
Federal east wireless, 1913.....	45 28 15.279 122 33 53.411	471.7 1160.2	105 55 48.7 121 59 47.1 127 11 45.8	285 49 42.9 301 54 57.8 307 06 22.9	Crest..... Oregonian..... Mills.....	11582.0 10378.7 12330.6	4.063784 4.016141 4.090985
Federal west wireless, 1913.....	45 28 15.237 122 34 00.350	470.4 7.6	106 08 31.9 122 26 50.8 127 37 37.2	286 02 31.0 302 22 06.4 307 32 19.2	Crest..... Oregonian..... Mills.....	11437.5 10251.8 12211.7	4.058331 4.010801 4.086775
Y. M. C. A. east wireless, Portland, ¹ 1913.	45 31 06.346 122 40 42.779	195.9 928.5	156 31 44.5 201 19 47.8	336 31 13.6 21 19 50.5	Mills..... Oregonian.....	2360.9 227.5	3.373075 2.356931
Y. M. C. A. west wireless, Portland, ¹ 1913.	45 31 07.046 122 40 45.131	217.5 979.6	157 28 17.2 215 06 37.1	337 27 48.0 35 06 41.5	Mills..... Oregonian.....	2321.0 232.6	3.365682 2.366578
Journal spire, 1913.....	45 31 08.123 122 40 44.245	250.8 960.3	45 39 44.0 156 42 40.1 162 35 10.7 216 06 57.3	225 38 31.1 336 42 10.2 342 34 06.6 36 07 01.0	Crest..... Mills..... River..... Oregonian.....	3100.3 2297.9 6496.4 194.3	3.491402 3.361328 3.812673 2.288575
Old Garbage Plant, chlmney, 1913....	45 32 32.126 122 41 40.440	991.8 877.3	327 14 01.5 331 17 36.4 11 49 58.1	147 14 11.7 151 18 20.2 191 49 25.3	Mills..... Oregonian..... Crest.....	574.1 2777.7 4863.8	2.759021 3.443677 3.686977
Columbia Flour Mills, water tank, 1913.	45 33 17.272 122 41 45.588	533.2 988.9	8 11 19.2 164 28 43.7 339 19 03.1	188 10 50.1 344 28 23.4 159 19 50.6	Crest..... River..... Oregonian.....	6217.6 2294.9 4093.8	3.793624 3.360768 3.612128

¹ No check on this position.

Columbia River from the mouth of the Willamette River to the Cascade Locks.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points.</i>							
Shaw, 1889.....	45 36 36.677 122 40 11.844	1132.3 256.7	245 05 05.8 310 30 31.8	65 06 44.6 130 35 01.4	Harney..... Rocky Butte.....	<i>Meters.</i> 3303.7 10772.0	3.519004 4.032296
Stansbury, 1889.....	45 34 31.018 122 38 53.697	957.6 1164.3	193 53 20.4 295 39 21.9	13 54 03.4 115 42 55.7	Harney..... Rocky Butte.....	5429.4 7205.1	3.734753 3.857642
Wintler, 1889.....	45 36 55.201 122 36 16.673	1704.2 361.3	337 48 52.6 37 24 58.6 83 37 12.0	157 50 34.3 217 23 06.4 263 34 23.9	Rocky Butte..... Stansbury..... Shaw.....	8179.1 5603.4 5127.6	3.912705 3.748450 3.709914
Lower Point, 1889.....	45 35 41.492 122 34 19.337	1281.0 419.1	354 08 53.4 131 50 16.0	174 09 11.3 311 48 52.2	Rocky Butte..... Wintler.....	5326.5 3412.3	3.726439 3.533052
Hexter, 1889.....	45 36 19.075 122 33 34.453	588.9 746.6	3 48 51.0 39 58 48.5 64 17 37.8	183 48 36.8 219 58 16.4 244 13 49.6	Rocky Butte..... Lower Point..... Stansbury.....	6473.3 1514.1 7682.2	3.811128 3.180159 3.885487
Jungle, 1889.....	45 36 24.261 122 38 58.155	749.0 1260.4	103 30 22.3 218 16 06.3	283 29 29.7 38 16 52.5	Shaw..... Harney.....	1642.2 2260.2	3.215418 3.354150
Quartermasters Wharf, 1889.....	45 37 15.229 122 40 10.710	470.2 232.1	266 07 11.5 315 01 09.3 1 10 58.0	86 08 49.5 135 02 01.1 181 10 57.2	Harney..... Jungle..... Shaw.....	2978.5 2224.3 1190.5	3.474000 3.347190 3.075715
Rauer, 1889.....	45 37 35.003 122 41 54.739	1080.6 1185.8	285 08 49.0 308 55 09.2	105 10 03.3 128 56 22.7	Quartermasters Wharf..... Shaw.....	2334.9 2865.7	3.368263 3.457232
Sisters farm, 1889.....	45 37 58.564 122 41 42.665	1808.0 923.9	322 05 51.7 19 46 37.4	142 06 56.6 199 46 28.8	Shaw..... Rauer.....	3203.5 773.0	3.505631 2.888169
Allman, 1889.....	45 38 37.375 122 43 09.278	1153.9 200.9	302 33 43.0 320 01 00.7	122 34 44.9 140 01 54.0	Sisters farm..... Rauer.....	2225.9 2512.9	3.347513 3.400181
Hayden, 1889.....	45 38 10.567 122 43 39.888	326.2 863.9	218 41 19.6 278 17 32.7	38 41 41.5 98 18 56.5	Allman..... Sisters farm.....	1060.5 2565.9	3.025502 3.409238
Hood, 1891.....	45 35 02.674 122 32 07.846	82.6 170.1	29 23 30.6 141 29 37.8	209 22 14.6 321 28 35.9	Rocky Butte..... Hexter.....	4705.6 3014.5	3.672611 3.479219
Prune Hill, 1891.....	45 34 59.249 122 27 20.144	1829.2 436.7	64 59 29.3 90 59 58.9	244 54 47.9 270 56 33.4	Rocky Butte..... Hood.....	9425.1 6238.0	3.974748 3.795047
Mays, 1891.....	45 34 19.266 122 32 26.721	594.8 579.4	34 32 37.9 134 01 41.3	214 31 35.4 313 58 57.0	Rocky Butte..... Wintler.....	3350.6 6929.6	3.525125 3.840707
Taggarts Bluff, 1891.....	45 33 30.929 122 27 40.649	954.9 881.8	81 08 46.4 103 33 13.1 189 15 33.4	261 04 19.6 283 29 48.7 9 15 48.0	Rocky Butte..... Mays..... Prune Hill.....	8203.5 6380.8 2762.7	3.913998 3.804873 3.441335
Fisher, 1891.....	45 35 22.597 122 30 38.431	697.6 833.1	279 29 59.1 42 01 51.6 72 24 11.1	99 32 20.6 221 59 31.7 252 23 07.2	Prune Hill..... Rocky Butte..... Hood.....	4358.5 6346.3 2033.6	3.639337 3.802522 3.308259
Harlow, 1891.....	45 32 27.941 122 22 34.257	862.6 743.2	92 41 37.6 127 01 24.4	272 33 32.2 306 58 00.3	Rocky Butte..... Prune Hill.....	14768.6 7762.9	4.169340 3.890024
Daniels, 1891.....	45 34 58.377 122 26 29.048	1802.2 629.8	312 20 39.4 67 42 23.0	132 23 27.1 247 37 05.1	Harlow..... Rocky Butte.....	6891.9 10439.3	3.838341 4.018671
Washougal, 1891.....	45 34 41.118 122 20 58.040	1269.4 1258.3	26 55 09.0 94 16 45.2	206 54 00.3 274 12 48.8	Harlow..... Daniels.....	4610.8 7196.1	3.663774 3.857097
Eagles Bluff, 1891.....	45 32 32.576 122 21 23.918	1005.7 518.9	124 15 16.3 188 02 49.8	304 11 38.4 8 03 08.3	Daniels..... Washougal.....	8903.2 4007.9	3.903265 3.602922
Mount Pleasant, 1891.....	45 33 46.256 122 15 45.882	1428.0 995.0	72 47 53.3 99 08 06.2 104 04 46.2 85 53 24.6	252 43 52.0 279 00 26.8 284 01 03.3 265 40 27.5	Eagles Bluff..... Daniels..... Washougal..... Rocky Butte.....	7677.1 14122.5 6977.6 23672.0	3.885195 4.149912 3.843704 4.374235
Remington, 1891.....	45 35 05.605 122 29 03.637	173.0 78.8	274 59 18.3 56 24 38.6	95 00 32.2 236 21 11.1	Prune Hill..... Rocky Butte.....	2252.2 7569.3	3.352604 3.879058
Government Island, 1891.....	45 34 31.743 122 27 55.223	980.0 1197.4	125 11 01.0 221 50 42.5	305 10 12.1 41 51 07.5	Remington..... Prune Hill.....	1814.6 1140.0	3.258788 3.056892
Quarry, 1891.....	45 35 03.054 122 28 20.283	94.3 439.7	275 08 36.5 330 39 32.0 94 47 37.6	95 09 19.4 150 39 49.9 274 47 06.6	Prune Hill..... Government Island..... Remington.....	1309.1 1108.9 943.1	3.116959 3.044889 2.974576
Ladys Island, 1891.....	45 34 22.952 122 24 03.816	708.6 82.7	109 10 04.6 262 03 18.0 331 18 34.0	289 08 20.8 82 05 30.7 151 19 37.9	Daniels..... Washougal..... Harlow.....	3333.3 4066.9 4047.3	3.522880 3.609260 3.607165
Brush, 1901.....	45 32 07.830 122 19 47.330	241.7 1026.9	162 03 02.9 239 51 18.5	342 02 12.4 59 54 10.8	Washougal..... Mount Pleasant.....	4974.7 6055.2	3.696770 3.782129
Cliff, 1901.....	45 32 24.726 122 14 37.065	763.4 804.1	85 36 00.0 117 02 30.5 149 20 13.3	265 32 18.0 296 57 58.6 329 19 24.2	Brush..... Washougal..... Mount Pleasant.....	6751.9 9273.8 2926.4	3.829425 3.967260 3.466334
Grout, 1901.....	45 33 45.749 122 15 28.823	1412.4 625.1	335 49 22.8 61 41 48.3 103 29 55.4	155 49 59.7 241 38 43.8 283 26 00.4	Cliff..... Brush..... Washougal.....	2741.8 6370.6 7340.6	3.438039 3.804177 3.865730

Columbia River from the mouth of the Willamette River to the Cascade Locks—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
Shepard, 1901.....	45 32 51.460 122 11 44.687	1588.7 969.4	77 34 15.9 109 02 39.8	257 32 12.8 288 59 59.8	Cliff..... Grout.....	Meters. 3829.6 5142.3	3.583157 3.711160
Mount Zion, 1901.....	45 34 52.151 122 12 23.595	1610.0 511.5	347 14 11.7 32 28 10.1 62 58 42.0	167 14 39.5 212 26 34.8 242 56 29.7	Shepard..... Cliff..... Grout.....	3820.4 5394.0 4509.3	3.582110 3.731907 3.654113
Angel, 1901.....	45 34 14.020 122 09 18.692	432.8 405.4	51 10 54.4 106 22 57.4	231 09 10.2 286 20 45.4	Shepard..... Mount Zion.....	4064.8 4178.4	3.609043 3.621005
Twin Mountain, 1901.....	45 35 47.928 122 09 03.406	1479.6 73.8	6 31 19.5 32 42 45.4 68 22 33.2	186 31 08.6 212 40 50.3 248 20 10.2	Angel..... Shepard..... Mount Ziou.....	2918.1 6473.9 4608.7	3.465098 3.811165 3.669194
Railroad, 1901.....	45 34 32.100 122 08 39.504	991.0 856.6	56 42 10.5 97 16 59.8 167 31 18.2	236 41 42.5 277 14 19.8 347 31 01.1	Angel..... Mount Zion..... Twin Mountain.....	1016.7 4897.8 2397.7	3.007176 3.690004 3.379792
Oneonta, 1901.....	45 35 20.430 122 04 35.784	630.7 775.7	74 15 18.0 98 21 09.4 148 51 25.1	254 12 23.9 278 17 58.2 328 30 32.0	Railroad..... Twin Mountain..... Bluff.....	5490.4 5862.6 3085.6	3.739602 3.768094 3.489842
Bluff, 1901.....	45 36 45.662 122 05 50.140	1409.7 1086.5	41 41 39.5 66 57 56.7	221 39 38.5 246 55 38.6	Railroad..... Twin Mountain.....	5520.8 4551.8	3.741999 3.658180
Lookout, 1901.....	45 37 35.640 122 02 52.826	1100.3 1144.4	28 08 01.1 68 08 05.4	208 06 47.5 248 05 58.7	Oneonta..... Bluff.....	4733.2 4139.8	3.675151 3.616983
Dodson, 1901.....	45 36 38.813 122 01 33.862	1198.3 783.8	58 28 41.4 92 12 22.6 135 43 44.4	238 26 31.4 272 09 19.5 315 42 48.0	Oneonta..... Bluff..... Lookout.....	4626.2 5537.1 2450.5	3.665221 3.744851 3.389252
Warren, 1901.....	45 36 51.863 122 00 29.232	1601.3 633.3	73 57 22.9 113 29 48.0	253 56 36.7 293 28 05.4	Dodson..... Lookout.....	1457.2 3301.9	3.163518 3.530437
Climb, 1901.....	45 38 42.631 122 00 28.191	1316.1 610.5	0 22 40.3 20 25 07.5 56 34 50.9	180 22 39.5 200 24 20.5 236 33 07.5	Warren..... Dodson..... Lookout.....	3419.8 4078.8 3753.8	3.534007 3.610529 3.574472
Bonneville, 1901.....	45 37 39.542 121 57 40.619	1218.0 879.9	68 06 22.8 118 16 17.3	248 04 22.3 298 14 17.5	Warren..... Climb.....	3937.3 4120.3	3.595202 3.614931
Aldrich, 1901.....	45 39 14.398 121 58 44.027	444.6 953.2	334 53 31.3 27 23 11.5 66 30 35.1	154 54 16.6 207 21 56.2 246 29 20.6	Bonneville..... Warren..... Climb.....	3237.0 4955.5 2459.5	3.510144 3.695089 3.390852
Moffat, 1901.....	45 40 24.607 121 56 33.005	759.7 714.3	16 01 38.5 52 37 32.4	196 00 50.1 232 35 58.7	Bonneville..... Aldrich.....	5304.9 3569.8	3.724678 3.552645
Cascade, 1901.....	45 39 34.610 121 53 01.062	1068.5 23.0	59 36 14.0 85 13 49.6 108 36 58.7	239 32 54.1 265 09 44.3 288 34 27.1	Bonneville..... Aldrich..... Moffat.....	7020.8 7451.7 4840.6	3.846388 3.872233 3.684903
End, 1901.....	45 41 25.779 121 50 47.270	795.9 1022.8	40 10 06.3 75 52 05.4	220 08 30.6 255 47 58.1	Cascade..... Moffat.....	4490.6 7716.8	3.652302 3.887436
Stackhouse, 1901.....	45 42 31.794 121 51 27.662	981.6 598.4	336 47 19.6 20 17 17.4 59 18 21.5	156 47 48.5 200 16 10.6 239 14 43.0	End..... Cascade..... Moffat.....	2217.6 5831.8 7685.7	3.345875 3.765799 3.885684
Bradford, 1901.....	45 38 09.306 121 55 46.634	290.1 1010.1	99 34 46.4 117 36 00.6 66 28 50.9	279 31 25.0 297 33 53.7 346 28 17.7	Climb..... Aldrich..... Moffat.....	6183.4 4334.1 4293.4	3.791230 3.636901 3.632806
Locks, 1901.....	45 40 18.024 121 53 32.146	556.4 695.8	36 15 53.2 92 59 23.2 213 06 02.0 333 20 24.1	216 14 17.0 272 57 13.8 33 07 30.9 153 20 46.2	Bradford..... Moffat..... Stackhouse..... Cascade.....	4924.4 3919.9 4930.7 1499.8	3.692352 3.593278 3.692308 3.176026
<i>Supplementary points.</i>							
Vancouver Episcopal Church, ¹ 1889.....	45 37 35.59 122 41 42.64	1098.8 923.7	312 44 47 86 02 35	132 45 52 266 02 27	Shaw..... Rauer.....	2679.2 262.6	3.428006 2.419333
Lucca Mill, pipe, ¹ 1889.....	45 37 38.35 122 41 08.72	1184.0 188.9	327 05 02 84 05 01	147 03 43 264 04 28	Shaw..... Rauer.....	2268.1 1002.2	3.355654 3.006947
Sawmill, pipe, 1889.....	45 37 28.016 122 40 42.019	864.9 910.2	337 34 54.4 97 48 15.5	157 35 15.9 277 47 23.5	Shaw..... Rauer.....	1714.5 1590.0	3.234147 3.201404
Vancouver St. James Church, ¹ 1889.....	45 37 51.57 122 40 20.04	1592.1 434.1	355 36 20 76 00 25	175 36 26 255 59 18	Shaw..... Rauer.....	2319.0 2114.1	3.365309 3.325120
Vancouver Presbyterian Church, ¹ 1889.....	45 37 46.02 122 40 27.32	1420.8 591.8	331 05 43 79 49 30	171 05 54 259 48 28	Shaw..... Rauer.....	2167.0 1923.9	3.335852 3.284182
Railroad depot, northwest gable, 1889.....	45 36 26.189 122 39 38.373	808.6 831.6	114 03 41.8 155 10 10.5 232 56 17.7	294 03 17.9 335 09 47.4 52 57 32.6	Shaw..... Quartermasters Wharf..... Harney.....	794.3 1668.3 2846.1	2.899979 3.222268 3.454250
Vancouver lower flagstaff, 1889.....	45 37 37.925 122 39 36.016	1170.8 780.2	282 40 44.4 340 09 43.5 19 41 05.0 22 19 18.7	102 41 57.6 160 10 10.5 199 39 00.2 202 18 53.1	Harney..... Jungle..... Baich..... Shaw.....	2275.6 2417.7 11256.9 2044.0	3.357091 3.383395 4.051420 3.310490

¹ No check on this position.

Columbia River from the mouth of the Willamette River to the Cascade Locks—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
Vancouver upper flagstaff, 1889.....	45 37 34.619 122 39 12.813	1068.8 277.6	283 02 01.0 35 34 09.1 64 29 29.3	103 02 57.6 215 33 26.9 244 28 47.9	Harney..... Shaw..... Quartermasters Wharf.....	<i>Meters.</i> 1762.8 2199.0 1389.8	3.246207 3.342229 3.142954
Deaf and Dumb School, 1889.....	45 37 30.095 122 38 18.586	929.1 402.7	295 26 09.0 27 51 04.6 56 06 26.7 79 18 42.1	115 26 26.9 207 48 04.5 236 05 05.8 259 17 22.0	Harney..... Balch..... Shaw..... Quartermasters Wharf.....	600.9 11712.9 2956.5 2472.0	2.778785 4.068663 3.470783 3.393053
Marked tree, No. 1, 1889.....	45 36 05.689 122 37 23.808	175.6 516.0	105 40 29.4 120 42 42.5 164 39 33.4	285 39 22.0 300 40 43.3 344 39 12.2	Jungle..... Quartermasters Wharf..... Harney.....	2123.5 4205.8 2434.5	3.327049 3.623844 3.386417
Stenger, ¹ 1889.....	45 36 35.23 122 34 39.08	1087.6 846.8	352 03 09 55 13 57	172 03 41 235 10 55	Rocky Butte..... Stansbury.....	7025.2 6720.5	3.846656 3.827402
House, chimney, ¹ 1889.....	45 35 16.79 122 35 03.36	518.4 72.8	152 23 54 231 31 40	332 23 02 51 22 12	Wintler..... Lower Point.....	3428.6 1221.5	3.535122 3.086890
Fishers's wharf, southeast pile, ¹ 1891.	45 35 14.50 122 30 14.04	447.6 304.4	277 06 07 46 56 59	97 08 11 226 54 22	Prune Hill..... Rocky Butte.....	3799.1 6588.7	3.579682 3.815491
Bartlett's barn, north gable, 1891.....	45 34 33.230 122 28 09.955	1025.9 215.8	130 39 42.6 166 19 58.6 223 21 11.6	310 39 04.3 346 19 51.2 53 21 47.1	Remington..... Quarry..... Prune Hill.....	1534.1 947.6 1345.9	3.185859 2.976265 3.129025
Lever's house, east gable, ¹ 1891.....	45 34 36.64 122 28 39.89	1131.2 864.9	150 04 29 207 32 18	330 04 12 27 32 32	Remington..... Quarry.....	1031.7 919.6	3.013554 2.963592
Fairview, cupola, ¹ 1891.....	45 32 24.55 122 26 08.27	757.9 179.4	161 55 57 268 41 14	341 55 05 83 43 47	Prune Hill..... Harlow.....	5023.9 4644.4	3.701040 3.669329
Washougal Hall, flagstaff, 1891.....	45 34 42.128 122 21 13.598	1300.6 294.8	275 16 52.7 3 12 14.7 22 54 04.1 94 13 35.2	95 17 04.0 183 12 07.4 202 53 06.6 274 09 49.9	Washougal..... Eagles Bluff..... Harlow..... Daniels.....	338.7 4005.9 4496.9 6857.4	2.529868 3.602700 3.652916 3.836160
Washougal Schoolhouse, 1901.....	45 34 45.388 122 20 46.632	1401.2 1011.0	298 24 42.8 345 10 58.1 61 57 07.8	118 29 06.6 165 11 40.5 241 56 59.7	Cliff..... Brush..... Washougal.....	9116.1 5031.4 280.3	3.959807 3.701689 2.447563
Gibbons Creek, 1891.....	45 34 17.306 122 18 57.284	534.3 1242.1	44 32 31.3 105 41 44.7 282 59 08.1	224 30 46.6 285 40 18.5 103 01 24.7	Eagles Bluff..... Washougal..... Mount Pleasant.....	4535.3 2719.5 4259.9	3.656608 3.434496 3.629371
Gibbons Creek Church, ¹ 1901.....	45 34 31.96 122 18 54.54	986.8 1182.7	305 05 51 14 26 03	125 08 55 194 25 25	Cliff..... Brush.....	6827.6 4594.7	3.834271 3.662258
Williams, 1891.....	45 32 17.848 122 18 59.079	551.0 1281.8	149 45 21.4 236 56 23.3	329 43 56.5 56 56 37.1	Washougal..... Mount Pleasant.....	5120.7 5001.2	3.709328 3.699078
Chamberlain's barn, 1901.....	45 32 06.503 122 19 28.642	203.5 621.5	95 22 49.6 157 53 23.0 57 32 08.1	275 22 36.3 337 52 19.2 57 32 08.1	Brush..... Washougal..... Mount Pleasant.....	407.3 5149.6 5728.6	2.609892 3.711774 3.758050
Big barn, east gable, 1901.....	45 32 19.304 122 17 43.232	596.0 938.0	136 02 17.7 223 28 02.1 227 31 01.1	315 59 58.6 43 29 25.8 47 32 37.0	Washougal..... Mount Pleasant..... Grout.....	6084.4 3699.4 3952.6	3.784219 3.568133 3.596882
Corbett, 1901.....	45 32 32.474 122 17 15.285	1002.6 331.6	220 24 01.1 225 34 44.0 273 58 13.0	40 25 04.9 45 36 00.0 94 00 05.9	Mount Pleasant..... Grout..... Cliff.....	2991.6 3232.7 3441.0	3.475897 3.509567 3.536680
Tunnel Point, tree, 1901.....	45 32 35.528 122 16 28.733	1096.9 623.4	210 56 00.3 265 24 29.3 277 49 37.5	30 56 43.1 85 27 52.1 97 50 57.2	Grout..... Shepard..... Cliff.....	2527.6 6181.6 2445.5	3.402701 3.791103 3.388368
Rooster Rock, 1901.....	45 32 38.867 122 15 00.308	1199.9 6.7	81 16 51 115 58 37 154 35 23 163 19 35	261 13 26 295 54 22 334 34 51 343 19 15	Brush..... Washougal..... Mount Pleasant..... Grout.....	6300.5 8627.7 2303.4 2155.5	3.799375 3.935897 3.362368 3.333552
Middle fish wheel, 1901.....	45 33 29.133 122 14 58.347	899.4 1265.5	285 27 25.0 346 55 37.7 68 12 28.6	105 29 43.3 166 55 52.9 248 09 02.4	Shepard..... Cliff..... Brush.....	4358.7 2041.3 6752.8	3.639367 3.309909 3.829483
Lower fish wheel, 1901.....	45 33 25.536 122 15 46.672	788.4 1012.2	281 18 34.3 321 11 02.8 65 20 39.0	101 21 27.1 141 11 52.5 245 17 47.3	Shepard..... Cliff..... Brush.....	5353.3 2409.3 5745.5	3.728623 3.381884 3.759328
Small white barn, north gable, 1901..	45 32 23.457 122 15 36.328	724.2 788.1	183 39 56.5 222 18 02.2 260 12 57.0	3 40 01.9 42 20 19.8 80 15 42.4	Grout..... Mount Zion..... Shepard.....	2545.8 6208.5 5099.2	3.405823 3.792990 3.707498
White house chimney, small, ¹ 1901...	45 33 50.79 122 14 33.66	1568.2 730.1	1 35 26 04 59 23	181 35 24 244 55 39	Cliff..... Brush.....	2658.2 7510.0	3.424584 3.875638
Big barn, south gable, ¹ 1901.....	45 33 55.68 122 14 01.30	1718.9 28.1	303 46 23 15 26 58	123 48 01 195 26 33	Shepard..... Cliff.....	3565.1 2913.1	3.552070 3.464359
Mount Pleasant Church, 1901.....	45 33 50.419 122 13 55.899	1556.5 1212.3	226 23 33.4 302 35 20.9 18 39 17.4	46 24 39.3 122 36 54.6 198 38 48.0	Mount Zion..... Shepard..... Cliff.....	2763.7 3378.3 2792.2	3.441493 3.528694 3.445948

¹ No check on this position.

Columbia River from the mouth of the Willamette River to the Cascade Locks—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
Upper fish wheel, 1901	45 33 32.652	1008.0	296 35 41.3	116 37 04.9	Shepard.....	<i>Meters.</i> 2839.5	3.453247
	122 13 41.734	905.2	29 47 23.9 71 45 49.0	209 46 44.4 251 41 28.1	Cliff..... Brush.....	2416.3 8352.0	3.383144 3.921792
Red barn, cupola, 1901	45 32 23.395	722.3	135 37 02.7	315 35 40.8	Grout.....	3558.2	3.551228
	122 13 34.066	739.1	198 24 01.5 249 55 49.8	18 25 51.8 69 57 07.9	Mount Zion..... Shepard.....	4840.1 2526.1	3.684858 3.402450
Barn, west gable, 1901.....	45 33 55.072	1700.2	313 20 03.2	133 21 11.7	Shepard.....	2861.2	3.456552
	122 13 20.624	447.2	30 44 14.6 68 29 58.0	210 43 20.0 248 25 22.0	Cliff..... Brush.....	3244.9 9018.1	3.511195 3.955115
Sawmill, stack, 1901.....	45 32 32.016	988.4	122 52 23.1	302 50 27.0	Grout.....	4195.7	3.622806
	122 12 46.336	1005.3	186 30 05.1 245 49 16.1	6 30 21.3 65 50 00.1	Mount Zion..... Shepard.....	4354.4 1466.0	3.638927 3.166123
Cape Horn tree, 1901.....	45 34 03.818	117.6	229 10 22.5	49 12 25.1	Twin Mountain.....	4918.0	3.691789
	122 11 55.104	1194.9	264 40 44.0 354 13 26.0	84 42 35.7 174 13 32.4	Angel..... Shepard.....	3406.3 2562.2	3.532288 3.351269
Pyramid tree, 1901.....	45 35 17.351	535.8	254 03 31.5	74 05 20.5	Twin Mountain.....	3440.3	3.536593
	122 11 36.030	781.0	269 21 37.8 303 16 36.5	89 26 38.0 123 18 14.6	Oneonta..... Angel.....	9110.2 3562.2	3.959529 3.551712
House in trees, cupola, 1901.....	45 33 18.379	567.4	71 08 49.2	251 06 09.8	Cliff.....	5120.1	3.709281
	122 10 53.730	1165.4	146 03 47.7 207 22 38.9	326 02 43.5 27 23 57.6	Mount Zion..... Twin Mountain.....	3489.8 5199.9	3.542801 3.715993
Lone Rock, 1901.....	45 34 22.068	681.3	277 06 03.9	97 07 09.5	Angel.....	2007.3	3.302606
	122 10 50.550	1096.0	22 46 29.3 53 37 07.6	202 45 50.7 233 34 25.9	Shepard..... Cliff.....	3033.7 6104.2	3.481976 3.785628
Bridal Veil sawmill, ¹ 1901.....	45 33 26.74	825.6	140 01 48	320 00 35	Mount Zion.....	3441.1	3.536695
	122 10 41.63	903.0	206 01 51	26 03 01	Twin Mountain.....	4851.3	3.685854
White house, north gable, ¹ 1901	45 33 46.97	1450.2	123 46 34	303 44 55	Mount Zion.....	3620.7	3.558794
	122 10 04.78	103.6	199 36 20	19 37 04	Twin Mountain.....	3964.2	3.598151
Dead tree (near Cabin Falls), 1901.....	45 34 28.407	877.0	96 30 22.8	276 29 49.9	Railroad.....	1006.8	3.002956
	122 07 53.336	1157.1	148 16 18.7 212 12 42.7	328 15 28.7 32 14 10.7	Twin Mountain..... Bluff.....	2886.6 5009.0	3.460889 3.699751
Signboard, 1901	45 34 48.320	1491.8	201 38 14.2	21 39 01.6	Bluff.....	3897.5	3.590789
	122 06 56.465	1224.1	225 36 11.0 251 58 44.9	45 39 05.1 72 00 25.4	Lookout..... Oneonta.....	7386.7 3206.9	3.868449 3.506082
Tall post, 1901.....	45 34 47.570	1468.6	139 13 19.5	319 12 26.5	Twin Mountain.....	2461.1	3.391124
	122 07 49.244	1067.6	215 17 20.2 231 02 28.8	35 18 45.3 51 06 00.5	Bluff..... Lookout.....	4167.2 8257.7	3.650040 3.916857
Dead tree, back of bluff, 1901.....	45 36 49.487	1527.8	298 51 33.6	118 51 40.8	Bluff.....	244.6	2.388501
	122 06 00.028	0.6	326 24 20.7 64 27 33.3	146 25 20.9 244 25 22.3	Oneonta..... Twin Mountain.....	3300.4 4405.0	3.518570 3.643948
McGowan's cannery, 1901.....	45 36 31.891	984.6	95 07 30.8	275 04 53.8	Bluff.....	4779.6	3.679391
	122 02 10.438	226.2	154 59 21.5 208 44 43.2 254 54 26.1	334 58 51.2 28 45 56.3 74 54 52.2	Lookout..... Climb..... Dodson.....	2171.8 4604.1 820.9	3.336828 3.663148 2.914278
Barn near McGowan's, north gable, 1901.	45 36 14.461	446.4	101 59 15.1	281 56 45.2	Bluff.....	4645.9	3.667074
	122 02 20.400	442.1	164 20 36.8 207 58 27.9	344 20 13.6 27 59 48.1	Lookout..... Climb.....	2602.9 5180.2	3.415453 3.714349
Butlers Landing, ice house, 1901.....	45 36 53.336	1646.6	155 09 04.1	335 08 44.2	Lookout.....	1439.4	3.158167
	122 02 24.904	539.6	216 49 49.3 292 03 44.1	36 51 12.8 112 04 20.6	Climb..... Dodson.....	4216.3 1193.4	3.624935 3.076789
Warrendale Church, spire, 1901.....	45 36 43.698	1349.1	90 34 14.7	270 30 42.9	Bluff.....	6421.6	3.807640
	122 00 53.793	1165.6	121 53 10.2 188 35 10.3	301 51 45.1 8 35 28.6	Lookout..... Climb.....	3036.8 3713.5	3.482420 3.569783
Gorman's house, 1901.....	45 36 50.520	1559.7	116 40 26.0	296 38 54.5	Lookout.....	3104.4	3.491983
	122 00 44.769	970.0	185 55 17.1 262 58 39.4	5 55 29.0 82 58 50.5	Climb..... Warren.....	3479.8 339.2	3.541556 2.530431
Castle Rock, 1901.....	45 37 41.863	1292.4	328 43 43.0	148 44 13.9	Warren.....	1806.0	3.256711
	122 01 12.498	270.8	13 22 38.3 84 57 29.3	193 22 23.0 264 56 17.6	Dodson..... Lookout.....	2000.8 2181.8	3.301208 3.338814
Gorman's barn, 1901.....	45 36 52.228	1612.4	114 39 47.1	294 38 10.7	Lookout.....	3213.5	3.506983
	122 00 38.013	823.6	183 34 15.1 273 23 30.0	3 34 22.1 93 23 36.2	Climb..... Warren.....	3415.1 190.6	3.533407 2.280126
Warren's cannery, 1901.....	45 36 55.280	1706.6	70 33 19.1	250 33 09.2	Warren.....	316.9	2.500938
	122 00 15.440	334.6	110 05 23.2 175 14 14.5	290 03 30.7 355 14 05.4	Lookout..... Climb.....	3630.3 3325.8	3.559939 3.521891
Hamilton fish wheel, 1901.....	45 37 38.307	1182.6	57 35 17.8	237 34 03.3	Warren.....	2674.4	3.427228
	121 58 45.029	975.4	131 38 26.4 180 25 07.8	311 37 12.7 0 25 08.6	Climb..... Aldrich.....	2989.3 2966.7	3.475575 3.472277

¹ No check on this position.

Columbia River from the mouth of the Willamette River to the Cascade Locks—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Supplementary points—Continued.</i>							
Railway water tank, 1901.....	45 38 11.686 121 57 21.933	360.8 475.0	22 08 03.4 137 26 58.7 271 57 06.7	202 07 50.0 317 26 00.0 91 58 14.9	Bonneville..... Aldrich..... Bradford.....	Meters. 1074.3 2628.5 2065.3	3.031139 3.419709 3.314976
Fish wheel on north shore opposite Bradford Island, 1901.....	45 38 45.224 121 56 20.852	1396.2 451.6	40 23 57.4 89 10 05.8 106 12 51.6	220 23 00.4 280 07 09.0 286 11 09.2	Bonneville..... Climb..... Aldrich.....	2666.1 5356.8 3228.4	3.425874 3.728902 3.508990
Cascade Locks Church, 1901.....	45 40 11.476 121 53 24.224	354.3 524.3	39 18 05.1 95 41 03.1 139 41 30.9 210 11 49.7	219 16 23.3 275 38 48.0 319 41 25.3 30 13 13.1	Bradford..... Moffat..... Locks..... Stackhouse.....	4869.7 4106.3 265.1 5012.8	3.687500 3.613447 2.423380 3.700882
Cascade Locks flagstaff, 1901.....	45 40 13.323 121 53 35.858	411.3 776.1	208 58 14.0 212 57 55.7 327 46 33.4	28 58 16.7 32 59 27.3 147 46 58.3	Locks..... Stackhouse..... Cascade.....	165.9 5096.2 1412.8	2.219922 3.707247 3.150668

The secondary triangulation.

<i>Principal points.</i>							
Roman, 1903.....	43 54 45.041 123 44 14.987	1390.1 334.5					
Mary, 1903.....	44 30 17.369 123 33 05.732	536.1 126.6	12 47 13.03	192 39 26.37	Roman.....	67471.43	4.8291199
Table, 1908.....	44 28 10.361 123 50 37.387	319.8 826.4	260 19 19.07 352 09 00.72	80 31 36.02 172 13 27.28	Mary..... Roman.....	23566.77 62474.59	4.3723001 4.7957034
Cummins, 1908.....	44 14 10.036 123 59 30.690	309.8 681.1	204 25 54.36 229 27 14.39 330 22 18.08	24 32 07.18 49 45 42.75 150 32 55.04	Table..... Mary..... Roman.....	28500.31 46075.76 41329.31	4.4548496 4.5541326 4.6162582
Foulweather, 1908.....	44 45 23.059 124 02 58.427	711.8 1285.1	305 06 11.81 332 47 19.52 355 26 26.89	125 27 11.24 152 55 59.96 175 28 52.48	Mary..... Table..... Cummins.....	48405.24 35820.58 57996.36	4.6848024 4.5541326 4.7634007
Maple, 1908.....	43 54 20.294 124 00 02.917	626.3 65.1	181 06 56.67 207 50 26.39	1 07 19.08 88 01 23.79	Cummins..... Roman.....	36727.91 21166.02	4.5649662 4.3256392
Fairview, 1908.....	44 11 59.942 124 01 59.351	1850.1 1317.9	219 24 01.15 323 19 55.58 355 27 27.50	39 25 44.82 143 32 15.70 175 28 48.46	Cummins..... Roman..... Maple.....	5197.46 39768.92 32808.04	3.7157909 4.5995438 4.5159803
Cape, 1908.....	44 06 23.325 124 05 09.727	719.9 216.3	202 08 15.79 307 30 46.81 342 56 28.17	22 10 28.40 127 45 18.57 163 00 01.32	Fairview..... Roman..... Maple.....	11218.06 35295.34 23359.09	4.0499176 4.5477174 4.3680838
Dean, 1908.....	43 41 44.174 123 54 26.846	1363.3 601.2	162 11 13.72 209 31 00.25	342 07 21.11 29 38 03.78	Maple..... Roman.....	24515.71 27710.52	4.3894444 4.4426447
Trail, 1908.....	43 46 08.829 124 05 08.603	272.5 192.4	204 12 34.80 210 14 39.21 299 33 54.92	24 16 06.52 60 29 07.53 119 41 18.56	Maple..... Roman..... Dean.....	16634.75 32219.95 16522.67	4.2210162 4.5081248 4.2180801
Schooner, 1908.....	43 41 54.965 124 04 45.822	1696.4 1026.1	176 16 44.92 271 19 01.01	356 16 29.17 91 26 08.62	Trail..... Dean.....	7851.53 13864.82	3.8949541 4.1419144
Burn, 1908.....	43 43 18.358 124 07 58.535	566.6 1310.2	215 50 21.06 279 00 34.65 300 47 55.38	35 52 18.56 99 09 55.52 120 50 08.55	Trail..... Dean..... Schooner.....	6491.36 18403.79 5023.87	3.8123356 4.2649073 3.7010382
Bald, 1908.....	44 58 31.806 123 47 50.385	981.8 1104.0	3 45 23.13 39 23 52.54	183 43 25.61 219 13 11.96	Table..... Foulweather.....	56344.68 31467.57	4.7508529 4.4978632
Iron, 1908.....	44 41 35.609 124 03 07.559	1099.2 166.4	181 38 19.27 212 37 13.46 326 16 11.48	1 38 25.70 32 48 00.14 146 24 58.04	Foulweather..... Bald..... Table.....	7023.85 37280.92 29861.55	3.8465752 4.5714867 4.4751124
Cascade, 1908.....	45 03 42.352 123 58 03.055	1308.3 66.8	305 29 34.83 10 50 20.26	125 36 48.19 190 46 51.73	Bald..... Foulweather.....	16488.56 34548.29	4.2171826 4.5384265
Salmon, 1908.....	45 01 12.300 124 00 01.845	382.5 40.4	209 18 11.24 287 07 14.41 7 33 00.18	29 19 35.30 107 15 51.61 187 30 55.57	Cascade..... Bald..... Foulweather.....	5310.26 16770.82 29560.08	3.7251158 4.2245543 4.4707056
Saddle Mountain 2, 1909.....	45 58 10.281 123 41 04.267	317.4 91.9	158 16 24.1 189 24 23.6	338 06 27.2 9 29 35.0	Bear..... Ten.....	47777.0 56288.5	4.679219 4.750420
Tillamook Head, 1874.....	45 57 55.431 123 57 56.395	1711.4 1214.3	185 02 04.5 208 46 48.1 268 41 37.1	5 04 17.8 29 04 10.2 88 53 44.8	Bear..... Ten..... Saddle Mountain 2.....	44990.7 63961.0 21796.8	4.653123 4.805921 4.338392
Saddle Mountain, 1874.....	45 58 10.078 123 41 04.471	311.2 96.3	88 54 43.0 140 44 47.6 150 57 41.4	268 42 35.4 320 29 05.1 330 47 41.3	Tillamook Head..... Battery..... Scarboro Hill 2.....	21792.2 44238.3 36739.6	4.338302 4.645798 4.565135
Neahkahnie, 1875.....	45 44 39.064 123 56 27.126	1206.1 586.5	175 31 47.8 218 23 26.7	355 30 43.7 38 34 28.8	Tillamook Head..... Saddle Mountain.....	24662.6 31987.3	4.392039 4.504978

The secondary triangulation—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
Foley, 1875.....	45 39 07.551 123 49 20.683	233.1 447.9	138 00 36.2 196 50 44.7	317 55 31.0 16 56 40.5	Neahkahnie..... Saddle Mountain.....	Meters. 13779.5 36865.7	4.139233 4.560623
Crag, 1875.....	45 38 29.150 123 49 16.805	809.9 363.9	140 51 12.1 175 56 56.9	320 46 04.1 355 56 54.1	Neahkahnie..... Foley.....	14735.0 1188.5	4.168350 3.075011
Miami, 1875.....	45 34 59.868 123 54 22.484	1848.3 487.4	171 25 53.1 220 30 15.1 225 40 48.9	351 24 23.9 40 33 50.8 45 44 27.4	Neahkahnie..... Foley..... Crag.....	18084.1 10061.2 9252.9	4.257297 4.002650 3.966279
Boulder Point, 1866.....	45 29 33.102 123 55 02.769	1021.9 60.1	184 56 51.8 204 21 07.6	4 57 20.5 24 25 14.6	Miami..... Crag.....	10125.9 18170.5	4.005435 4.259366
Shell Point, 1866.....	45 30 33.768 123 53 15.878	1042.5 344.7	51 06 19.7 170 01 52.7 299 28 07.03 342 23 49.07 358 13 05.08	231 05 03.5 350 01 05.1 119 34 47.79 162 29 27.59 178 13 31.15	Boulder Point..... Miami..... Ginger..... Hebo..... Buzzard Butte.....	2382.2 8341.3 14090.07 34726.78 25668.29	3.474531 3.921236 4.1470600 4.5356331 4.4093969
Hebo, 1908.....	45 12 53.639 123 45 20.130	1655.9 439.2	7 03 16.91 44 29 00.95	187 01 30.49 224 20 00.18	Bald..... Cascade.....	26807.07 23821.76	4.4282493 4.3769739
Buzzard Butte, 1908.....	45 16 42.722 123 52 39.259	1318.9 855.7	306 24 04.26 349 21 14.73 16 23 24.96	126 29 16.10 169 24 39.44 196 19 35.32	Hebo..... Bald..... Cascade.....	11904.88 34263.61 25105.88	4.0757252 4.5348331 4.3997755
Ginger, 1908.....	45 26 49.816 123 48 53.794	1537.9 1169.1	4 10 26.65 31 26 34.79	184 09 25.24 211 20 20.88	Hebo..... Buzzard Butte.....	25882.40 21955.59	4.4130046 4.3415450
White, 1904.....	43 07 14.428 123 02 14.761	445.2 336.0					
Onion, 1904.....	42 41 31.762 123 13 46.921	980.1 1068.1	198 11 21.87	18 19 13.10	White.....	50126.59	4.7006681
Camas, 1906.....	43 00 07.386 123 46 38.943	227.9 882.1	257 25 01.30 307 21 59.59	77 55 20.37 127 44 20.66	White..... Onion.....	61709.33 56482.19	4.7903508 4.7519116
Boliver, 1907.....	42 47 31.996 123 50 07.463	987.3 109.6	191 27 11.94 282 25 36.66 240 27 50.25	11 29 33.88 102 50 16.60 61 00 27.85	Camas..... Onion..... White.....	23785.21 50827.47 74641.12	4.3763070 4.7060985 4.8729781
Johnson, 1906.....	42 48 55.841 124 05 35.651	1723.1 809.9	231 06 18.98 276 54 21.44	51 19 12.89 97 04 52.14	Camas..... Boliver.....	33080.51 21249.13	4.5195722 4.3273412
Bennett, 1906.....	42 57 32.991 124 16 23.770	1018.0 538.8	263 06 42.57 317 16 29.17 297 15 06.24	83 26 59.38 137 23 50.25 117 32 53.78	Camas..... Johnson..... Boliver.....	40720.28 21701.83 40297.64	4.6098108 4.3364964 4.6052796
Sugar, 1906.....	43 03 50.680 124 04 39.128	1563.9 885.4	2 39 45.27 53 55 25.08 285 38 03.17	182 39 06.76 233 47 24.41 105 50 20.31	Johnson..... Bennett..... Camas.....	27643.01 19760.81 25406.29	4.4415853 4.2958048 4.4049412
Westport, 1906.....	43 18 43.406 124 14 29.125	1339.5 656.4	334 08 05.88 3 47 31.87	154 14 49.67 183 46 13.48	Sugar..... Bennett.....	30601.77 39289.85	4.4857465 4.5942804
Cathcart, 1906.....	43 21 06.027 123 58 54.541	186.0 1228.4	13 42 57.70 78 16 54.65 28 37 48.86	193 39 01.78 258 06 13.32 208 25 51.20	Sugar..... Westport..... Bennett.....	32883.95 21510.00 49632.87	4.5169840 4.3326403 4.6957094
Noah, 1906.....	43 23 27.048 124 07 49.612	834.7 1116.6	289 48 42.57 45 49 34.79	109 54 50.01 225 45 00.54	Cathcart..... Westport.....	12808.62 12552.99	4.1075023 4.0987473
Marshfield Hill, 1889.....	43 22 25.591 124 12 51.690	789.8 1163.7	254 23 10.74 17 45 27.90 277 20 29.71	74 26 38.22 197 44 21.02 97 30 04.49	Noah..... Westport..... Cathcart.....	7059.32 7199.43 19009.50	3.8487629 3.8572980 4.2789708
Cape, 1907.....	42 50 13.493 124 33 51.928	416.4 1179.3	240 12 18.42 317 43 05.75	60 24 11.90 137 51 24.83	Bennett..... Bald.....	27376.30 24883.58	4.4373747 4.3959128
Butler, 1907.....	42 46 03.896 124 15 34.116	120.2 775.7	37 35 53.08 176 58 13.25 236 22 14.95	217 31 47.07 336 57 39.47 56 41 55.79	Bald..... Bennett..... Camas.....	13534.31 21293.94 47201.51	4.1314363 4.3282559 4.6739559
Madden, 1907.....	42 50 27.775 124 28 04.474	857.1 101.6	334 55 12.22 86 50 09.62	154 59 35.44 266 46 13.37	Bald..... Cape.....	20829.17 7902.94	4.3186720 3.8977888
Sixes, 1869.....	42 50 39.870 124 32 41.026	1230.8 931.6	273 22 29.99 289 57 12.16 321 48 27.16	93 25 38.04 110 08 50.03 141 55 58.14	Madden..... Butler..... Bald.....	6291.19 24838.89 24464.60	3.7987331 4.3951322 4.3885381
Heads, 1869.....	42 44 28.619 124 30 20.129	883.1 457.8	155 40 50.75 195 31 59.53 303 07 45.66	335 38 26.87 15 33 31.68 123 13 40.63	Cape..... Madden..... Bald.....	11680.08 11503.53 14231.66	4.0674457 4.0608312 4.1532554
Port Orford astronomical 2, 1907.....	42 44 28.918 124 30 05.312	892.3 120.8	88 25 56.21 193 55 03.04 303 55 12.49	268 25 46.16 13 56 25.13 124 00 57.42	Heads..... Madden..... Bald.....	337.14 11408.93 13955.78	2.5278184 4.0572450 4.1447542
Bald, 1907.....	42 40 16.220 124 21 36.745	500.5 836.7	192 30 03.35 232 09 06.12	12 33 36.06 52 32 52.45	Bennett..... Camas.....	32773.00 60173.67	4.5155162 4.7794065
Squirrel, 1907.....	42 35 52.651 123 52 46.417	1624.6 1088.2	101 49 06.96 141 22 12.41 190 30 11.72	281 29 35.00 321 06 09.81 10 34 21.43	Bald..... Bennett..... Camas.....	40255.03 51459.80 45659.78	4.6048201 4.7114681 4.6595338

The secondary triangulation—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
	° ' "		° ' "	° ' "		Meters.	
Stack, 1907.....	42 25 00.206 124 17 04.139	6.4 94.6	167 36 51.35 238 41 36.86	347 33 47.03 58 58 01.82	Bald..... Squirrel.....	28941.05 38896.40	4.4615147 4.5899094
Craggy, 1907.....	42 20 26.761 124 03 32.423	825.7 742.2	114 30 36.86 146 06 02.30 207 15 32.16	294 21 29.74 325 53 49.66 27 22 48.34	Stack..... Bald..... Squirrel.....	20397.06 44271.02 32155.68	4.3095676 4.6461195 4.5072576
Bosley, 1907.....	42 12 34.365 124 13 27.700	1060.3 635.4	167 51 53.54 213 13 34.43 223 02 49.56	347 49 27.84 33 27 31.50 43 09 30.00	Stack..... Squirrel..... Craggy.....	23540.67 51645.44 19963.09	4.3718189 4.7130320 4.3002278
Sundown 2, 1907.....	42 18 39.099 124 20 58.445	1206.4 1338.5	204 29 20.26 317 24 16.91	24 31 58.14 137 29 20.03	Stack..... Bosley.....	12923.81 15276.93	4.1113905 4.1840361
Grizzly, 1907.....	42 23 51.572 124 21 51.835	1591.3 1185.5	252 07 46.73 331 01 35.95 352 46 19.26	72 11 00.75 151 07 15.26 172 46 55.23	Stack..... Bosley..... Sundown 2.....	6911.31 23873.53 9718.53	3.8395603 4.3779167 3.9876006
Pollywog, 1913.....	42 11 53.015 124 02 42.911	1635.7 984.5	94 59 23.31 140 59 59.61 175 54 36.87	274 52 10.16 320 50 19.91 355 54 03.57	Bosley..... Stack..... Craggy.....	14847.11 41289.40 15892.07	4.1716419 4.4953973 4.2011805
Elk, 1913.....	42 01 52.188 124 07 21.656	1610.2 498.2	157 02 19.53 199 01 51.71	336 58 14.03 19 04 58.64	Bosley..... Pollywog.....	21524.04 19612.72	4.3329239 4.2925378
Pack Saddle, 1913.....	42 01 51.972 124 00 25.116	1603.5 577.8	90 04 43.16 137 51 53.86 170 19 32.16	270 00 04.27 317 43 08.99 350 17 59.75	Elk..... Bosley..... Pollywog.....	9581.88 26758.50 18812.76	3.9814508 4.4276170 4.2744525
High Divide, 1913.....	41 54 26.743 124 03 18.230	825.1 420.2	157 50 06.06 196 09 55.71	337 47 23.28 16 11 51.48	Elk..... Pack Saddle.....	14842.40 14303.33	4.1715040 4.1554370
Long Rldge, 1913.....	41 55 03.031 123 55 31.032	93.5 715.1	84 06 25.52 127 43 05.84 151 48 25.16	264 01 13.43 307 35 10.58 331 45 08.48	High Divide..... Elk..... Pack Saddle.....	10825.21 20665.31 14319.14	4.0344362 4.3152420 4.1559170
Bald Hill, 1913.....	41 45 38.401 124 01 51.288	1184.7 1184.8	172 59 30.77 206 41 47.32	352 58 32.77 26 46 00.96	High Divide..... Long Ridge.....	16423.58 19504.78	4.2154679 4.2901410
Gordon, 1913.....	41 48 00.303 123 52 04.575	9.3 105.6	72 08 52.90 127 33 34.77 159 57 38.64	252 02 22.08 307 26 05.28 339 55 20.87	Bald Hill..... High Divide..... Long Ridge.....	14239.10 19586.29 13834.38	4.1534824 4.2919522 4.1425265
Child, 1913.....	41 42 12.100 124 01 38.743	373.3 895.8	177 23 34.84 230 56 44.22	357 23 26.49 51 03 06.56	Bald Hill..... Gordon.....	6371.38 17069.89	3.8042332 4.2322307
Rattle, 1914.....	41 37 30.317 123 56 52.807	935.3 1222.4	142 45 25.97 198 53 48.46	322 42 15.89 18 57 00.25	Child..... Gordon.....	10924.11 20546.61	4.0383860 4.3127402
Red Mountain, 1913.....	41 31 29.256 123 54 26.568	902.6 616.0	153 16 01.72 158 35 33.30 163 05 46.77 186 07 10.26	333 11 14.71 338 30 37.79 343 04 09.73 6 08 44.65	Child..... Bald Hill..... Rattle..... Gordon.....	22213.77 28146.47 11642.90 30751.18	4.3466223 4.4494239 4.0660612 4.4878618
Mound, 1914.....	41 33 31.106 124 05 07.486	959.6 173.5	237 10 05.14 284 08 28.19	57 15 33.52 104 15 33.22	Rattle..... Red Mountain.....	13628.42 15324.15	4.1344456 4.1853763
Klamath South 2, 1914.....	41 31 56.380 124 04 32.326	1739.4 749.4	164 25 18.17 225 53 43.84 273 21 15.05	344 24 54.85 45 58 48.80 93 27 56.66	Mound..... Rattle..... Red Mountain.....	3033.87 14814.06 14068.69	3.4819974 4.1706742 4.1482537
Flint Rock 2, 1914.....	41 31 29.990 124 04 59.787	925.2 1386.2	177 15 58.78 218 01 18.40	357 15 53.68 38 01 36.61	Mound..... Klamath South 2.....	3740.79 1033.52	3.5729633 3.0143189
Flint Rldge, 1872.....	41 31 31.492 124 04 27.872	971.5 646.2	86 25 15.13 166 01 51.15 172 20 27.57	266 24 54.02 346 01 24.88 352 20 24.62	Flint Rock 2..... Mound..... Klamath South 2.....	741.39 3802.73 774.75	2.8700489 3.5800956 2.8891597
High Bluff, 1871.....	41 30 43.452 124 04 44.398	1340.5 1029.6	166 02 39.27 194 29 43.14	346 02 29.07 14 29 54.10	Flint Rock 2..... Flint Ridge, 1872.....	1479.40 1530.78	3.1700848 3.1849123
<i>Supplementary points.</i>							
Yaquina Head Lighthouse, 1908.....	44 40 37.967 124 04 42.826	1172.0 943.2	194 37 25.0 229 41 23.5 320 53 01.0	14 38 38.4 49 42 30.5 141 07 54.4	Foulweather..... Iron..... Table.....	9095.3 2750.9 29673.3	3.955818 3.439472 4.472366
Life, 1908.....	44 35 17.474 124 03 58.231	539.4 1284.5	174 19 48.1 185 27 37.4 306 37 39.8	354 19 16.8 5 28 13.0 126 47 01.4	Yaquina Head Lighthouse..... Iron..... Table.....	9941.6 11725.4 22057.3	3.997455 4.069129 4.343552
Yaquina Lighthouse, old tower, 1908.....	44 37 28.640 124 03 43.722	884.0 963.8	183 53 30.6 185 57 46.6 314 42 56.5 4 31 12.3	3 54 02.5 5 58 12.0 134 52 08.1 184 31 02.1	Foulweather..... Iron..... Table..... Life.....	14678.3 7664.9 24234.9 4061.4	4.166676 3.884507 4.384442 3.608671
Enchre Mountain, 1908.....	44 50 08.193 123 52 12.293	252.9 270.1	200 15 30 357 02 52 29 32 34 42 23 25 163 01 22	20 18 35 177 03 59 209 24 18 222 15 44 342 57 15	Bald..... Table..... Life..... Iron..... Cascade.....	16573.8 40732.2 31582.1 21401.5 26283.4	4.219421 4.609638 4.499441 4.330445 4.419682
Hill, first east of Yaquina Lighthouse, 1908.....	44 40 33.570 124 04 24.317	1036.2 535.6	221 25 37 321 25 21 356 37 29	41 26 31 141 35 01 176 37 48	Iron..... Table..... Life.....	2554.4 29312.2 9774.0	3.407292 4.467048 3.990074

The secondary triangulation—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
	° ' "		° ' "	° ' "		Meters.	
Grass Mountain, 1908.....	44 25 22.31 123 40 28.10	688.6 621.7	49 15 12 111 07 00 141 20 43	229 00 09 290 59 53 321 04 55	Fairview..... Table..... Foulweather.....	37840.4 14436.9 47549.3	4.578025 4.159474 4.677144
Cape Lookout, summit, 1908.....	45 21 49.696 123 55 44.844	1534.2 976.0	239 00 04 336 52 57 346 27 14 355 52 24	59 08 30 156 55 09 166 32 42 175 52 54	Ginger..... Buzzard Butte..... Bald..... Round Top.....	18026.9 10302.7 43380.1 16180.0	4.255920 4.012952 4.647188 4.208978
Bill, 1907.....	43 00 57.102 124 18 43.282	1762.1 980.1	254 15 39.1 333 20 19.8	74 25 15.2 153 21 54.9	Sugar..... Bennett.....	19845.0 7047.1	4.297651 3.849013
Edson, 1907.....	42 52 22.415 124 19 59.602	691.7 1352.8	186 12 37.1 207 02 15.4 224 23 51.4	6 13 29.1 27 04 42.4 44 34 18.8	Bill..... Bennett..... Sugar.....	15974.6 10761.8 29769.3	4.203479 4.031883 4.473775
Cotton, 1907.....	42 57 23.382 124 17 39.281	721.5 890.3	260 09 47.8 18 55 48.3	80 10 39.3 198 54 12.8	Bennett..... Edson.....	1737.1 9817.6	3.239813 3.992003
Coquille River Lighthouse, 1907.....	43 07 27.808 124 25 24.242	858.1 548.0	323 00 12.5 326 15 55.1 330 31 15.0 345 13 24.7	143 04 46.4 146 22 04.0 150 36 32.3 165 17 06.1	Bill..... Bennett..... Cotton..... Edson.....	15088.6 22058.8 21416.6 28890.7	4.178648 4.343581 4.330750 4.460759
Camas, U. S. G. S., ¹ 1907.....	43 00 07.193 123 46 38.914	220.0 881.4	173 40 13	353 46 13	Camas.....	5.982	0.77685
Rocky Peak, 1906.....	42 39 37.810 124 20 47.277	1166.7 1076.7	182 37 33.5 190 12 15.6 349 19 46.9 136 27 29.6	2 38 05.8 10 15 14.7 169 22 17.8 316 26 56.1	Edson..... Bennett..... Stack..... Bald.....	23618.7 33713.5 27554.1 1635.2	4.373256 4.527804 4.440186 3.213573
Saddle Mountain, 1907.....	42 24 09.007 124 07 40.213	277.9 919.6	97 02 14.3 147 28 25.0 320 23 38.5	276 55 53.9 327 18 59.4 140 26 25.5	Stack..... Bald..... Craggy.....	12991.5 35427.7 8897.7	4.113658 4.549343 3.949277
Tower Rock, 1907.....	42 52 35.122 124 32 36.566	1083.8 830.0	247 17 30.4 1 37 50.8 21 23 13.2	67 28 32.8 181 37 47.7 201 22 21.9	Bennett..... Sixes..... Cape.....	23902.2 3557.9 4693.4	4.378437 3.551189 3.671484
Collers Butte, 1907.....	42 21 56.586 124 07 39.848	1746.0 911.8	24 42 26.3 113 45 07.6 150 41 51.5 163 24 35.8	204 38 32.3 293 38 47.2 330 32 26.0 343 10 14.4	Bosley..... Stack..... Bald..... Edson.....	19090.3 14095.9 38938.8 58807.5	4.280813 4.149093 4.590383 4.769433
Pilot Knob, 1907.....	42 50 18.556 124 14 02.349	572.6 53.3	115 15 50.8 166 33 12.0 282 27 21.9	295 11 47.8 346 31 35.7 102 33 06.4	Edson..... Bennett..... Johnson.....	8966.4 13784.5 11788.9	3.952619 4.139391 4.071474
Salmon Mountain, 1907.....	42 46 19.368 124 09 59.310	597.6 1348.4	54 50 16.0 104 41 32.9 231 03 59.2 157 15 40.4	234 42 22.8 284 26 07.4 -51 19 52.2 337 11 18.8	Bald..... Sixes..... Camas..... Bennett.....	19426.3 31967.0 40775.9 22544.4	4.288391 4.504702 4.610403 4.353039
Mount Chetco or Mount Emery, ¹ 1907	42 06 20.19 124 09 03.55	622.9 81.6	152 18 44.5 196 10 48.3	332 15 47.2 16 14 30.8	Bosley..... Craggy.....	13040.6 27202.0	4.115299 4.434601
Red Mountain, ¹ 1907.....	42 08 27.40 123 57 55.80	845.4 1281.4	109 41 44.8 160 51 26.2	289 31 19.1 340 47 39.8	Bosley..... Craggy.....	22705.3 23499.2	4.356128 4.371053
Island Rock, ¹ 1907.....	42 40 01.75 124 28 31.72	54.1 722.3	165 31 16 267 15 23	345 30 12 87 20 04	Port Orford astronomic..... Bald.....	8514.7 9460.3	3.930168 3.975906
Sister Rock, ¹ 1907.....	42 35 41.05 124 24 22.33	1266.7 509.0	203 56 32 351 03 52	23 58 24 171 05 34	Bald..... Grizzly.....	9291.3 22159.7	3.968078 4.345564
Small hill southwest of Bosley, 1913..	42 07 37.968 124 13 35.106	1171.5 806.3	181 03 52 242 12 45 321 08 39	1 03 57 62 20 03 141 12 50	Bosley..... Pollywog..... Elk.....	9146.7 16913.9 13693.3	3.961264 4.228244 4.136509
St. Georges Reef Lighthouse, 1913.....	41 50 14.693 124 22 27.574	453.3 636.2	196 40 30.37 224 02 20.64 234 39 04.85 253 32 31.11	16 46 31.78 44 12 26.04 54 53 48.62 73 45 18.26	Bosley..... Elk..... Pack Saddle..... High Divide.....	43159.19 29978.15 37296.96 27621.82	4.6350733 4.4768049 4.5716734 4.4412523
Bear Mountain, 1913.....	41 47 47.761 123 40 16.503	1473.5 381.0	111 14 40 124 58 26 133 11 30	290 59 18 304 40 20 312 58 03	High Divide..... Elk..... Pack Saddle.....	34168.0 45623.3 38134.1	4.533620 4.659187 4.581314
Preston Peak, 1914.....	41 50 08.065 123 36 40.063	248.8 924.4	35 39 01 50 16 54 67 09 05 79 37 09 198 10 28 251 09 12	215 27 12 230 03 27 246 52 27 259 26 54 18 25 52 71 38 15	Red Mountain..... Rattle..... Child..... Gordon..... Onion..... Sterling.....	42425.4 36498.4 37601.9 21099.1 100216.0 63419.8	4.027626 4.562274 4.575210 4.336441 5.000037 4.802225
Second Peak north of Preston Peak, 1914.	41 52 10.179 123 36 39.595	314.0 913.1	70 13 33 96 40 12 118 47 52	250 03 16 276 22 24 298 31 58	Gordon..... High Divide..... Pack Saddle.....	22692.7 37093.2 37419.5	4.355887 4.569330 4.573098
Preston Peak, south, 1914.....	41 50 00.703 123 36 33.305	21.7 768.5	36 00 09 50 42 50 67 33 48	215 48 15 230 29 18 247 17 05	Red Mountain..... Rattle..... Child.....	42332.4 36474.1 37653.2	4.626673 4.561985 4.575859

¹ No check on this position.

The secondary triangulation—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
	° ' "		° ' "	° ' "		Meters.	
Four Brothers, No. 1, 1914.....	41 44 59.702 123 47 08.085	1841.9 186.8	75 40 12 128 05 44 149 36 13	255 30 32 307 54 57 329 27 19	Child..... High Divide..... Pack Saddle.....	20777.2 28412.2 36235.6	4.317588 4.453505 4.559135
Four Brothers, No. 2, 1914.....	41 44 22.008 123 47 22.297	679.0 515.3	78 38 03 130 18 36 150 56 52	258 28 33 310 07 59 330 48 08	Child..... High Divide..... Pack Saddle.....	20198.3 28892.9 37082.7	4.305315 4.460791 4.569171
Four Brothers, No. 3, 1914.....	41 44 10.405 123 47 31.561	321.0 729.4	22 17 14 46 29 42 79 31 14 131 07 20	202 12 38 226 23 29 259 21 50 310 56 49	Red Mountain..... Rattle..... Child..... High Divide.....	25371.3 17912.9 19920.2 28904.2	4.404342 4.253165 4.299293 4.461861
Four Brothers, No. 4, 1914.....	41 43 43.094 123 47 40.975	1329.5 947.0	22 33 42 48 01 54 81 49 45 132 38 18	202 29 13 227 55 48 261 40 28 312 27 54	Red Mountain..... Rattle..... Child..... High Divide.....	24509.4 17181.2 19568.9 29304.6	4.389333 4.235054 4.291566 4.467824
Rock, 1914.....	41 34 46.403 124 07 20.282	1431.6 469.9	323 24 27.3 326 22 49.9 331 44 08.9 334 14 57.7	143 26 18.7 146 24 44.3 151 45 42.1 154 16 41.2	Klamath South 2..... Flint Ridge..... Flint Rock 2..... High Bluff.....	6531.7 7219.6 6878.8 8320.5	3.815023 3.858514 3.837515 3.920150
Peak, No. 6, ¹ 1914.....	41 39 52.78 123 39 06.42	1628.3 148.5	53 59 42 79 59 59	233 49 31 259 48 11	Red Mountain..... Rattle.....	26371.8 25067.0	4.421140 4.399103
Sawtooth, North, ¹ 1914.....	41 36 52.35 123 42 37.37	1615.1 865.2	58 49 24 93 27 49	238 41 33 273 18 21	Red Mountain..... Rattle.....	19218.5 19839.0	4.283720 4.297519
Sawtooth, South, ¹ 1914.....	41 36 46.33 123 42 38.84	1429.3 899.3	59 14 48 94 00 18	239 06 58 273 50 51	Red Mountain..... Rattle.....	19093.8 19817.1	4.280892 4.297039
Peak, No. 8, ¹ 1914.....	41 33 04.44 123 46 31.03	137.0 719.1	75 07 33 119 43 13	255 02 18 299 36 21	Red Mountain..... Rattle.....	11407.6 16573.8	4.057193 4.219422
Redding Rock Lighthouse, 1914.....	41 20 26.735 124 10 40.095	824.8 932.2	201 04 58.42 201 49 58.05 202 49 00.76 203 26 01.20 211 12 55.08	21 08 43.62 21 54 01.44 22 53 07.08 23 29 56.55 31 22 03.08	Flint Rock 2..... Klamath South 2..... Flint Ridge..... High Bluff..... Rattle.....	21934.11 22925.07 22254.45 20741.26 36953.26	4.3411200 4.3603107 4.3474169 4.3168352 4.5676528

Columbia River to Tillamook Bay.

Principal points.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
Redwood, 1875.....	45 41 49.839 123 56 12.199	1538.7 263.9	176 27 57.5 299 19 05.1	356 27 46.8 119 23 59.5	Neahkahnie..... Foley.....	5234.6 10219.4	3.718880 4.009425
Fishery, 1875.....	45 41 20.587 123 55 25.890	635.6 560.2	132 02 01.3 167 48 36.8	312 01 28.2 347 47 53.0	Redwood..... Neahkahnie.....	1348.9 6269.2	3.129989 3.797212
Seely, 1875.....	45 42 39.637 123 56 16.985	1223.8 367.4	176 35 51.1 345 37 40.5 356 08 50.6	356 35 43.9 155 38 17.1 176 08 54.0	Neahkahnie..... Fishery..... Redwood.....	3693.6 2679.2 1540.9	3.567455 3.428010 3.187784
Landing, 1875.....	45 39 53.751 123 55 37.439	1659.5 810.4	168 08 58.4 185 19 32.1	348 08 33.5 5 19 40.3	Redwood..... Fishery.....	3662.1 2692.5	3.563733 3.430162
Point, 1875.....	45 40 12.394 123 56 09.051	382.7 195.9	178 42 10.7 203 55 18.1 310 03 54.5	358 42 08.4 23 55 49.0 130 04 17.1	Redwood..... Fishery..... Landing.....	3009.2 2303.2 894.2	3.478454 3.362341 2.951423
Keaton, 1875.....	45 38 37.400 123 56 24.926	1154.7 540.0	182 39 12.2 186 40 57.3 194 13 38.9 203 33 40.5	2 39 21.3 6 41 08.7 14 14 21.2 23 34 14.5	Redwood..... Point..... Fishery..... Landing.....	5947.6 2952.9 5197.7 2571.7	3.774342 3.470242 3.715809 3.410217
Carlton, 1875.....	45 44 54.592 123 57 51.420	1685.5 1111.4	334 30 51.2 339 22 30.8 345 43 47.2	154 32 35.4 159 23 41.9 165 45 00.6	Fishery..... Redwood..... Point.....	7318.5 6094.2 8989.4	3.864421 3.784919 3.953733
Sherman, 1874.....	46 08 57.251 123 57 17.829	1767.7 382.6	153 17 31.4 193 58 17.1	333 13 30.3 13 59 58.7	Battery..... Scarboro Hill 2.....	15912.2 12483.6	4.201731 4.096340
Boom, 1874.....	46 07 03.681 123 56 31.298	113.7 672.1	155 18 33.4 164 06 17.9 187 21 32.9	335 13 58.8 344 05 44.4 7 22 40.9	Battery..... Sherman..... Scarboro Hill 2.....	19505.7 3646.1 15750.2	4.290161 3.561824 4.197286
Morrison, 1874.....	46 06 58.180 123 55 44.096	1796.4 946.9	99 31 01.7 151 19 01.3 152 53 42.7 183 38 49.4	279 30 27.7 331 17 53.7 332 48 34.1 3 39 23.5	Boom..... Sherman..... Battery..... Scarboro Hill 2.....	1027.7 4191.0 20101.3 15822.1	3.011863 3.622320 4.303224 4.199264
Goodwin, 1874.....	46 05 10.883 123 55 13.843	336.0 297.4	154 28 29.6 168 54 20.5	334 27 33.8 348 53 58.7	Boom..... Morrison.....	3859.7 3376.0	3.586550 3.528404
Lake, 1874.....	46 04 59.607 123 55 51.594	1840.4 1108.6	167 27 13.4 182 31 05.1 246 45 52.9	347 26 44.8 2 31 10.5 66 46 20.1	Boom..... Morrison..... Goodwin.....	3924.7 3664.6 887.2	3.593803 3.564026 2.945793

¹ No check on this position.

Columbia River to Tillamook Bay—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Condit, 1874.....	46 03 25.781 123 54 57.019	796.0 1225.6	157 57 50.5 173 38 38.9	337 57 11.2 353 38 26.8	Lake..... Goodwin.....	3125.4 3265.2	3.494901 3.513908
Callender, 1874.....	46 03 47.042 123 55 38.071	1452.4 818.3	172 36 38.5 191 22 09.2 306 38 34.3	352 36 28.8 11 22 26.7 126 39 03.9	Lake..... Goodwin..... Condit.....	2259.3 2640.5 1099.8	3.353966 3.421684 3.041317
Gearhart, 1874.....	46 01 37.104 123 55 28.170	1145.6 605.7	176 57 49.1 191 17 08.8	356 57 42.0 11 17 31.2	Callender..... Condit.....	4017.5 3421.6	3.603960 3.534234
Meadow, 1874.....	46 01 42.929 123 55 11.811	1325.4 254.0	62 55 41.4 171 37 16.6	242 55 29.6 351 36 57.7	Gearhart..... Callender.....	395.1 3873.4	2.596743 3.588095
Loomis, 1874.....	46 00 33.994 123 55 00.712	1049.6 15.3	163 08 20.9 173 36 01.8	343 08 01.1 353 35 53.8	Gearhart..... Meadow.....	2036.1 2141.7	3.308796 3.330763
Grimes, 1874.....	46 00 04.834 123 55 34.223	149.2 736.4	182 36 58.7 218 41 08.3	2 37 03.0 38 41 32.4	Gearhart..... Loomis.....	2851.8 1153.5	3.455126 3.092005
Dunce, 1874.....	45 58 33.180 123 57 03.767	1024.4 81.1	199 54 09.5 214 14 51.5	19 55 18.3 34 15 55.9	Gearhart..... Grimes.....	6099.8 3423.7	3.781020 3.534502
Rivulet, 1874.....	45 58 25.885 123 57 31.820	799.2 685.0	204 14 49.9 219 37 45.6 249 32 39.2	24 16 18.8 39 39 10.2 69 32 59.4	Gearhart..... Grimes..... Dunce.....	6475.8 3967.3 644.6	3.811291 3.598496 2.809259
Cliff, 1874.....	45 58 05.576 123 58 12.813	172.2 275.9	208 27 46.8 222 02 21.6 222 48 59.9	28 29 45.2 42 04 39.8 42 50 54.0	Gearhart..... Loomis..... Grimes.....	7430.1 6171.9 5021.0	3.870994 3.790422 3.700786
Ledge, 1874.....	45 58 11.379 123 58 03.525	351.3 75.9	207 44 34.8 223 31 04.7 236 43 31.2	27 46 26.5 42 32 52.1 56 43 54.0	Gearhart..... Grimes..... Rivulet.....	7177.8 4753.7 816.4	3.855994 3.677030 2.911803
<i>Supplementary points.</i>							
Islet 1, 1874.....	45 56 48.948 123 59 41.636	1511.3 896.8	173 40 02.7 189 59 17.2 192 09 04.6 198 04 03.0 202 04 17.6 211 29 26.6	353 37 45.6 10 02 42.2 12 11 21.6 18 06 48.5 22 07 12.8 31 32 28.9	Battery..... Scarboro Hill 2..... Boom..... Lake..... Callender..... Gearhart.....	36923.8 35135.8 19416.5 15937.1 13932.0 10436.3	4.567306 4.545750 4.288171 4.202408 4.144012 4.018545
Islet 2, 1874.....	45 56 46.927 123 59 44.004	1448.9 947.8	173 45 22.1 190 03 06.4 192 15 31.7 198 10 16.8	353 43 06.7 10 06 33.2 12 17 50.4 18 13 04.0	Battery..... Scarboro Hill 2..... Boom..... Lake.....	36980.1 35206.1 19488.3 16012.2	4.567968 4.546618 4.289773 4.204451
Pinnacle Rock, 1874.....	45 56 49.184 123 59 32.860	1518.6 707.7	191 36 39.5 197 25 43.3 201 21 36.7 210 37 10.8	11 38 50.1 17 28 22.4 21 24 25.6 30 40 06.8	Boom..... Lake..... Callender..... Gearhart.....	19370.5 15872.5 13855.3 10332.5	4.287140 4.200645 4.141615 4.014206
Dexter, ¹ 1874.....	45 58 35.387 123 56 12.994	1092.6 279.7	86 26 18.5 189 44 59.1	266 25 42.0 9 45 31.3	Dunce..... Gearhart.....	1095.1 5692.9	3.039469 3.755330
Flagstaff, 1874.....	45 58 51.142 123 55 59.396	1579.0 1278.6	68 11 41.1 187 28 00.9	248 10 54.8 7 28 23.4	Dunce..... Gearhart.....	1492.5 5168.0	3.173926 3.713321
Sea-Side House, cupola, ¹ 1874.....	45 58 43.081 123 55 45.057	1330.1 970.0	79 46 51.1 183 52 02.0	259 45 54.5 3 52 14.1	Dunce..... Gearhart.....	1721.7 5385.3	3.235968 3.731207
Tillamook Rock Lighthouse, 1909.....	45 56 15.939 124 01 04.858	492.1 104.7	176 31 27.2 192 28 03.0 232 51 45.2	356 30 10.0 12 32 27.9 52 54 00.7	Battery..... Scarboro Hill 2..... Tillamook Head.....	37786.1 36484.8 5090.3	4.577332 4.562112 3.706740
Outermost Rock of Tillamook Bay, ¹ 1875.....	45 29 41.52 123 59 03.06	1281.8 66.4	189 20 08 190 56 40	9 22 10 10 58 45	Redwood..... Point.....	22788.2 19838.8	4.357710 4.297516
Eastern Peak Double Rock, ¹ 1875.....	45 34 05.98 123 57 53.48	184.6 1159.7	188 41 58 191 18 00	8 43 10 11 19 15	Redwood..... Point.....	14487.9 11536.4	4.161004 4.062070
Flagstaff, ¹ 1875.....	45 39 16.23 123 55 54.15	501.1 1172.5	169 27 36 197 20 17	349 27 25 17 20 29	Point..... Landing.....	1763.8 1213.6	3.246442 3.084006
Middle Peak Neahkahnie, 1875.....	45 44 38.089 123 56 35.709	1176.0 771.9	260 38 27 351 49 23 354 24 27 355 58 34	80 38 33 171 50 04 174 24 43 175 58 53	Neahkahnie..... Landing..... Redwood..... Point.....	188.0 8868.5 5219.3 8223.2	2.27418 3.94785 3.71761 3.91504
Southwest Peak Neahkahnie, 1875.....	45 44 38.583 123 56 42.679	1191.2 922.6	267 28 21 350 52 33 352 47 09 354 56 17	87 28 32 170 53 20 172 47 32 174 56 41	Neahkahnie..... Landing..... Redwood..... Point.....	336.5 8906.4 5251.3 8251.1	2.52704 3.94970 3.72027 3.91651
Cape Falcon Rock, 1875.....	45 45 52.872 123 59 46.150	1632.4 997.2	312 42 14.9 328 19 23.2 335 54 33.7	132 49 42.5 148 21 56.4 155 57 09.2	Foley..... Redwood..... Point.....	18429.2 8814.8 11512.7	4.265507 3.945213 4.061178
Onion Peak, 1875.....	45 49 00.633 123 53 02.507	19.5 54.1	345 18 01.5 11 14 08.6 13 54 26.2	165 20 40.3 191 12 17.6 193 52 12.6	Foley..... Landing..... Point.....	18928.4 17213.3 16799.9	4.277113 4.235864 4.226307

¹ No check on this position.

Columbia River to Tillamook Bay—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
Falcon, 1875.....	45 45 45.575 123 58 47.585	1407.1 1028.5	331 55 01.9 335 12 16.2 341 32 58.7 346 50 42.0	151 57 26.2 155 14 07.4 161 34 52.2 166 52 24.1	Fishery..... Redwood..... Point..... Keaton.....	Meters. 9271.2 8016.2 10842.9 13574.7	3.967135 3.903967 4.035147 4.132731
Bend, ¹ 1875.....	45 41 17.41 123 53 37.15	537.5 803.9	106 37 56 149 27 21	286 36 05 329 25 19	Redwood..... Neahkahnie.....	3501.0 7230.1	3.544192 3.850147
Large rock off Carlton, ¹ 1875.....	45 45 05.18 123 53 04.55	159.9 98.3	338 02 50 344 32 22	158 04 10 164 33 45	Redwood..... Point.....	6501.9 9378.2	3.813037 3.972119
A, ¹ 1875.....	45 47 20.40 123 55 48.80	629.8 1054.1	358 58 41 1 53 59	178 58 49 181 53 45	Landing..... Point.....	13791.9 13221.4	4.139625 4.121278
E, ¹ 1875.....	45 47 17.59 123 54 27.03	543.1 583.8	6 20 50 9 32 58	186 19 59 189 31 45	Landing..... Point.....	13787.2 13311.4	4.139476 4.124223
F, ¹ 1875.....	45 48 38.58 123 53 53.97	1191.1 1165.2	7 52 13 10 35 52	187 50 59 190 34 15	Landing..... Point.....	16357.1 15898.3	4.213706 4.201351
Hill a, ¹ 1875.....	45 47 24.03 123 55 47.84	741.9 1033.2	331 19 00 9 28 00	151 23 37 189 27 32	Foley..... Neahkahnie.....	17465.7 5163.4	4.242187 3.712934
Hill b, ¹ 1875.....	45 47 18.90 123 55 10.27	583.5 221.8	333 28 27 18 36 27	153 32 37 198 35 32	Foley..... Neahkahnie.....	16049.2 5206.6	4.220150 3.716556
Hill c, ¹ 1875.....	45 45 29.89 123 55 08.86	922.8 191.5	327 25 28 47 09 28	147 29 37 227 08 32	Foley..... Neahkahnie.....	14002.4 2307.3	4.146202 3.363109

Tillamook Bay.

<i>Principal points.</i>							
Doty, 1908.....	45 32 13.758 123 51 07.607	424.7 165.0	316 40 13.6 42 03 24.2 45 50 44.8	136 45 23.0 222 01 52.6 225 47 57.0	Ginger..... Shell Point..... Boulder Point.....	13738.7 4156.8 7117.2	4.137946 3.618756 3.852307
Green Hill 2, 1908.....	45 33 44.811 123 55 53.361	1383.4 1157.3	294 21 57.2 309 17 08.6 329 53 55.7 351 57 12.1	114 25 21.2 129 25 41.9 149 55 48.1 171 57 48.2	Doty..... Ginger..... Shell Point..... Boulder Point.....	6806.2 20203.2 6816.3 7848.1	3.832907 4.305421 3.833550 3.894762
Pitcher Point, 1866.....	45 30 25.282 123 56 32.300	780.5 701.1	187 48 21.5 266 27 53.1 309 38 26.9	7 48 49.3 86 30 13.2 129 39 30.8	Green Hill 2..... Shell Point..... Boulder Point.....	6217.6 4272.0 2524.6	3.793626 3.630628 3.402191
Tillamook Bay west base, 1866.....	45 30 10.264 123 52 54.797	316.9 1189.7	67 34 35.9 147 45 40.2	247 33 04.6 327 45 25.1	Boulder Point..... Shell Point.....	3006.1 857.9	3.478002 2.933431
Rock Point, 1866.....	45 29 04.669 123 54 19.555	144.1 424.7	133 05 32.5 206 40 45.0 222 15 24.6	313 05 01.7 26 41 30.4 42 16 25.1	Boulder Point..... Shell Point..... Tillamook Bay west base.....	1285.0 3078.6 2736.4	3.108888 3.488352 3.437183
Mud, 1866.....	45 29 27.668 123 52 46.120	854.2 1001.4	70 43 22.0 93 14 58.1 171 50 54.3	250 42 15.3 273 13 20.6 351 50 48.1	Rock Point..... Boulder Point..... Tillamook Bay west base.....	2149.7 2972.0 1328.5	3.332372 3.473046 3.123349
Slough, 1866.....	45 29 20.626 123 52 12.045	636.8 261.6	79 55 29.8 106 22 32.5 148 47 57.3	259 53 58.7 286 22 08.2 328 47 26.8	Rock Point..... Mud..... Tillamook Bay west base.....	2812.4 771.2 1791.6	3.449077 2.887178 3.253253
Tillamook Bay east base, 1866.....	45 30 10.968 123 52 22.818	338.6 495.4	351 26 22.1 20 43 56.8 88 12 32.7	171 26 29.8 200 43 40.2 268 12 09.9	Slough..... Mud..... Tillamook Bay west base.....	1571.7 1429.3 694.588	3.196364 3.155131 2.841727
Sand (1908), 1908.....	45 32 57.737 123 57 00.448	1782.5 9.7	225 01 42.9 280 01 23.2	45 02 30.8 100 05 35.1	Green Hill 2..... Doty.....	2056.6 7774.3	3.313143 3.890659
Pyramid Rock, 1908.....	45 29 46.512 123 59 01.573	1435.9 34.2	203 59 24.2 209 01 05.5 246 06 46.8	24 00 50.6 29 03 19.8 66 12 25.0	Sand (1908)..... Green Hill 2..... Doty.....	6462.4 8414.6 11221.1	3.810394 3.925032 4.050036
Spit, 1908.....	45 32 56.737 123 56 53.819	1751.6 1167.4	102 07 17.2 221 27 18.8 25 17 07.0	282 07 12.5 41 28 02.0 205 15 35.8	Sand (1908)..... Green Hill 2..... Pyramid Rock.....	147.1 1980.5 6494.3	2.167569 3.296777 3.812533
Cape Mears Lighthouse, 1908.....	45 29 13.038 123 58 38.821	402.5 843.0	154 27 04.0 197 05 51.9 198 15 08.0	334 26 47.8 17 07 02.0 18 16 22.9	Pyramid Rock..... Sand (1908)..... Spit.....	1145.5 7258.2 7272.5	3.058978 3.860828 3.861681
Stump, 1866.....	45 29 38.402 123 52 13.659	1185.6 296.6	64 49 25.4 137 45 52.5 168 48 44.6	244 49 02.3 317 45 23.2 348 48 38.1	Mud..... Tillamook Bay west base..... Tillamook Bay east base.....	778.9 1328.7 1024.9	2.891466 3.123416 3.010678
Sandstone Point, 1866.....	45 31 48.683 123 53 52.633	1503.0 1142.2	340 57 59.3 19 59 39.0 53 24 12.9	160 58 25.5 199 58 49.0 233 22 19.0	Shell Point..... Boulder Point..... Pitcher Point.....	2446.5 4454.0 4317.2	3.388549 3.648748 3.635207

¹ No check on this position.

Tillamook Bay—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Flat, 1866.....	45 32 10.820 123 56 25.062	334.0 543.8	281 39 34.9 2 45 39.0	101 41 23.7 182 45 33.9	Sandstone Point..... Pitcher Point.....	<i>Meters.</i> 3377.3 3262.0	3.528574 3.513484
Memalust Head, 1866.....	45 32 52.465 123 54 23.569	1619.7 511.2	341 10 28.5 31 35 43.4 64 00 34.9	161 10 50.6 211 34 11.6 243 59 08.2	Sandstone Point..... Pitcher Point..... Flat.....	2080.4 5333.9 2932.6	3.318140 3.727048 3.467258
Sand Hill, 1866.....	45 33 02.541 123 56 35.147	78.4 762.4	276 12 24.7 352 11 47.6	96 13 58.6 172 11 54.8	Memalust Head..... Flat.....	2871.1 1611.7	3.458052 3.207279
Bailey Point, 1866.....	45 33 28.030 123 55 20.262	865.4 439.4	311 45 18.6 30 32 06.7 64 09 31.4	131 45 59.1 210 31 20.6 244 08 38.0	Memalust Head..... Flat..... Sand Hill.....	1648.6 2767.3 1804.9	3.217107 3.442055 3.256444
Green Hill, 1866.....	45 33 45.257 123 55 53.429	1397.2 1158.7	309 53 37.4 13 14 48.3 34 27 33.0	129 54 41.5 193 14 25.7 214 27 03.2	Memalust Head..... Flat..... Sand Hill.....	2540.7 2995.2 1599.3	3.404955 3.476422 3.203936
Brush, 1866.....	45 32 06.014 123 57 08.493	185.7 184.3	299 24 18.7 329 57 23.2 345 49 15.0	119 27 04.6 149 58 52.9 165 49 40.8	Shell Point..... Boulder Point..... Pitcher Point.....	5796.2 5452.8 3207.5	3.763146 3.736619 3.506170
Middle, 1866.....	45 31 10.126 123 57 22.438	312.6 487.0	213 35 52.1 230 50 05.4 321 49 28.0	33 36 33.0 50 52 13.1 141 50 03.8	Flat..... Memalust Head..... Pitcher Point.....	2249.7 5004.5 1761.0	3.352128 3.699364 3.245760
Sand, 1866.....	45 33 23.691 123 56 32.248	731.4 699.5	231 39 31.6 289 02 29.2 5 30 05.1	51 39 59.3 109 04 01.0 185 30 03.0	Green Hill..... Memalust Head..... Sand Hill.....	1073.3 2953.0 656.0	3.030741 3.470261 2.816895
<i>Supplementary points.</i>							
Bailey's house, southeast gable, 1866..	45 33 27.903 123 55 15.298	861.4 331.8	314 16 16.9 329 38 40.4 32 27 38.6	134 16 53.8 149 39 39.4 212 26 48.8	Memalust Head..... Sandstone Point..... Flat.....	1567.2 3549.5 2820.2	3.195114 3.550173 3.450281
New house, near Bailey's, east gable, 1866.	45 33 30.563 123 55 04.154	943.6 90.1	323 10 59.6 35 29 37.6 77 22 56.2	143 11 28.6 215 28 40.0 257 22 44.7	Memalust Head..... Flat..... Bailey Point.....	1469.2 3023.5 358.0	3.167607 3.480566 2.553898
Morgan's new barn, south gable, 1866.	45 30 14.795 123 52 23.008	456.8 499.5	49 27 52.4 78 32 41.6 117 02 32.4	229 26 29.3 258 32 19.0 297 01 54.7	Rock Point..... Tillamook Bay west base..... Shell Point.....	3330.3 704.1 1288.6	3.522485 2.847658 3.110102
House No. 6, 1866.....	45 28 41.257 123 54 02.063	1273.7 44.8	207 59 12.9 229 00 33.1 233 08 28.8	28 00 00.9 49 01 27.3 53 09 46.1	Tillamook Bay west base..... Mud..... Stump.....	3112.0 2184.7 2941.8	3.493036 3.339398 3.468620
House No. 3, south gable, 1866.....	45 29 09.261 123 51 59.427	285.9 1290.6	119 16 22.3 147 27 08.8 165 04 26.8	299 15 49.0 327 26 29.3 345 04 10.1	Mud..... Tillamook Bay west base..... Tillamook Bay east base.....	1162.4 2234.3 1971.6	3.065337 3.349148 3.294820
House No. 2, north gable, 1866.....	45 29 10.734 123 51 44.591	331.4 968.3	117 07 34.7 140 19 57.9 155 56 58.4	297 07 15.1 320 19 07.8 335 56 31.1	Slough..... Tillamook Bay west base..... Tillamook Bay east base.....	669.9 2387.8 2036.4	2.825983 3.377991 3.308866
Clark's house, chimney, 1866.....	45 30 15.994 123 52 13.300	493.8 288.7	350 05 09.9 0 23 03.6 25 32 00.1	179 05 10.8 180 23 03.3 205 31 36.7	Slough..... Stump..... Mud.....	1709.6 1160.6 1653.4	3.232882 3.064680 3.218373
Log, 1866.....	45 30 24.940 123 52 56.502	770.0 1226.6	36 03 04.6 59 44 14.5 122 56 30.1	216 02 05.4 239 42 44.5 302 56 16.3	Rock Point..... Boulder Point..... Shell Point.....	3064.8 3174.4 501.2	3.486406 3.501656 2.700013
Gap, 1866.....	45 30 37.552 123 57 30.632	1159.3 664.9	206 17 31.3 245 04 49.5 271 11 05.7	26 18 18.1 65 07 25.1 91 14 07.5	Flat..... Sandstone Point..... Shell Point.....	3211.9 5216.1 5531.3	3.506756 3.717346 3.742824

Nestugga Bay.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points.</i>							
Round Top, 1908.....	45 13 06.937 123 54 51.469	214.1 1123.0	203 23 26.3 271 49 47.1	23 25 00.2 91 56 32.6	Buzzard Butte..... Hebo.....	<i>Meters.</i> 7258.7 12473.3	3.860858 4.095980
Flat, 1908.....	45 10 21.015 123 53 54.323	648.7 1186.3	166 19 08.1 187 54 16.8 247 10 40.4	346 18 27.6 7 55 10.1 67 16 45.2	Round Top..... Buzzard Butte..... Hebo.....	5271.8 11896.9 12173.0	3.721961 4.075433 4.085396
Fletcher, 1883.....	45 09 29.427 123 56 22.622	908.4 494.1	196 29 54.1 243 48 03.6	16 30 58.8 63 49 48.8	Round Top..... Flat.....	7003.4 3609.1	3.845306 3.557404
Bozley, 1883.....	45 09 13.150 123 57 42.985	405.9 939.0	207 24 16.3 247 13 08.1 254 01 05.4	27 26 18.0 67 15 50.4 74 02 02.4	Round Top..... Flat..... Fletcher.....	8130.7 5415.7 1825.9	3.910130 3.733656 3.261473
Gage B, 1908.....	45 11 08.964 123 56 08.091	276.7 176.6	204 39 22.0 296 51 44.9 5 53 49.6 30 06 23.8	24 40 16.5 116 53 19.9 185 53 39.3 210 05 16.5	Round Top..... Flat..... Fletcher..... Bozley.....	4007.5 3274.4 3089.1 4132.4	3.602875 3.515130 3.489834 3.616204

Nestugga Bay—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azlmuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
Haystack Rock, 1883.....	45 12 45.422	1402.2	263 14 16.1	83 17 19.0	Round Top.....	Meters.	
	123 59 09.165	200.0	269 06 53.5	89 16 41.9	Hebo.....	5662.0	3.752971
			302 56 17.9	123 00 01.3	Flat.....	18092.1	4.257489
			330 32 32.5	150 40 33.3	Bald.....	8191.9	3.913382
Sheep Hill, 1883.....	45 09 41.514	1281.6	285 44 13.8	105 44 56.8	Fletcher.....	30243.9	4.480637
	123 57 23.225	507.3	26 14 30.1	206 14 16.1	Bozley.....	6817.7	3.833640
			166 55 25.3	346 55 14.3			
			222 47 12.2	42 47 44.3			
Fern Hill, 1883.....	45 08 54.821	1692.4	126 26 11.3	306 25 46.4	Bozley.....	952.7	2.978977
	123 57 07.895	172.5	25 31 26.4	205 30 55.7	Sheep Hill.....	1479.8	3.170211
Goose, 1883.....	45 09 59.068	1823.5	357 22 11.3	177 22 12.7	Fletcher.....	916.0	2.961901
	123 56 24.546	536.1	25 31 26.4	205 30 55.7	Fern Hill.....	2197.8	3.341982
			67 05 03.9	247 04 22.3	Sheep Hill.....	1391.4	3.143452
Craven, 1883.....	45 09 58.424	1803.6	35 54 20.2	215 53 59.2	Fletcher.....	1105.1	3.043405
	123 55 52.950	1156.4	91 39 16.2	271 38 53.8	Goose.....	690.3	2.839048
Vine Maple, 1883.....	45 10 20.715	639.5	303 03 50.9	123 04 25.2	Craven.....	1261.2	3.100770
	123 56 41.346	902.9	331 13 52.1	151 14 04.0	Goose.....	762.3	2.882150
			345 30 58.7	165 31 12.0	Fletcher.....	1635.3	3.213587
Gage, 1883.....	45 10 33.138	1023.0	358 24 55.4	178 24 56.3	Craven.....	1072.0	3.030211
	123 55 54.307	1185.9	32 07 31.6	212 07 10.1	Goose.....	1241.8	3.094068
			69 31 53.8	249 31 20.4	Vine Maple.....	1096.4	3.039966
Grass, 1883.....	45 10 51.508	1590.1	303 53 21.6	123 53 49.0	Gage.....	1017.0	3.007305
	123 56 32.969	719.8	331 55 36.6	151 56 04.9	Craven.....	1857.2	3.268853
Nestucca, 1883.....	45 09 31.691	978.3	10 53 32.9	190 53 27.0	Vine Maple.....	968.0	2.985886
	123 58 09.133	199.5	253 10 08.1	73 10 40.7	Sheep Hill.....	1047.6	3.020178
			315 03 32.1	135 03 50.7	Bozley.....	808.6	2.907733
Point, 1883.....	45 10 00.658	20.3	298 54 46.6	118 55 21.3	Sheep Hill.....	1222.2	3.087131
	123 58 12.208	266.6	336 28 43.0	156 29 03.8	Bozley.....	1599.5	3.203977
			355 42 19.5	175 42 21.7	Nestucca.....	896.7	2.952669
Shersinger, 1883.....	45 09 54.941	1696.1	39 02 44.2	219 02 25.3	Nestucca.....	924.1	2.965720
	123 57 42.481	927.8	105 12 45.5	285 12 24.4	Point.....	672.8	2.827862
Beach, 1883.....	45 10 41.818	1291.0	332 42 49.9	152 43 21.0	Sheep Hill.....	2094.6	3.321102
	123 58 07.190	157.0	339 32 58.5	139 33 16.0	Shersinger.....	1544.4	3.188770
			4 55 45.1	184 55 41.5	Point.....	1275.3	3.105625
Green Bluff, 1883.....	45 10 19.734	609.2	29 51 47.1	209 51 32.8	Shersinger.....	882.6	2.945740
	123 57 22.360	488.3	61 35 35.4	241 35 00.0	Point.....	1237.6	3.092575
			124 51 33.4	304 51 01.6	Beach.....	1192.9	3.076605
Red Rock, 1883.....	45 10 53.886	1663.5	14 49 26.3	194 49 17.2	Green Bluff.....	1090.6	3.037663
	123 57 09.582	209.2	21 32 50.2	201 32 26.8	Shersinger.....	1956.4	3.291449
			73 30 23.7	253 29 42.8	Beach.....	1311.8	3.117876
Talbert, 1883.....	45 08 37.929	1170.9	171 52 52.4	351 52 47.4	Bozley.....	1098.3	3.040725
	123 57 35.884	784.0	229 32 19.2	49 32 39.0	Fern Hill.....	803.6	2.905061
Shortridge, 1883.....	45 08 54.583	1685.0	230 14 15.3	50 14 37.7	Bozley.....	896.2	2.952419
	123 58 14.524	317.3	269 42 11.0	89 42 58.2	Fern Hill.....	1455.6	3.163037
			301 20 17.9	121 20 45.3	Talbert.....	988.4	2.994925
Faulconer, 1883.....	45 08 01.989	61.4	187 18 03.6	7 18 10.3	Shortridge.....	1636.9	3.214016
	123 58 24.046	525.5	223 28 48.3	43 29 22.4	Talbert.....	1529.2	3.184454
Spruce, 1883.....	45 10 45.146	1398.7	225 33 47.4	43 34 41.3	Fern Hill.....	2329.9	3.367332
	123 56 51.423	1122.8	244 00 39.9	64 00 53.0	Grass.....	448.2	2.651505
			286 32 56.4	106 33 36.9	Gage.....	1301.0	3.114289
			318 28 36.4	138 29 17.8	Craven.....	1926.3	3.284727
Adler Point, 1883.....	45 10 55.357	1708.9	124 14 20.1	304 14 07.2	Red Rock.....	479.6	2.680862
	123 56 38.638	843.6	313 49 44.8	133 49 48.8	Grass.....	171.6	2.234452
			3 09 53.4	183 09 51.5	Vine Maple.....	1071.0	3.029804
Mullaney, 1883.....	45 11 27.300	842.8	41 31 36.9	221 31 27.8	Spruce.....	421.0	2.624330
	123 57 10.115	220.8	325 07 31.3	145 07 53.6	Alder Point.....	1201.9	3.079874
			342 35 13.3	162 35 26.5	Spruce.....	1363.8	3.134751
Sand Dune, 1883.....	45 11 14.913	460.4	359 21 12.5	179 21 12.8	Red Rock.....	1031.6	3.013493
	123 57 49.809	1087.4	246 11 06.6	66 11 34.7	Mullaney.....	947.1	2.976414
			306 27 52.7	126 28 21.1	Red Rock.....	1092.1	3.038254
Buckhorn, 1883.....	45 11 03.478	107.4	222 16 11.9	42 16 22.3	Sand Dune.....	477.0	2.678548
	123 58 04.506	98.4	283 51 57.6	103 52 36.5	Red Rock.....	1235.2	3.091725
			5 00 32.1	185 00 30.1	Beach.....	671.2	2.826881
Barnhart, 1888.....	45 10 54.925	1695.6	122 54 59.2	302 54 28.2	Sand Dune.....	1135.6	3.055243
	123 57 06.140	134.0	175 02 14.9	355 02 12.1	Mullaney.....	1003.2	3.001386
			268 43 28.1	88 43 47.5	Alder Point.....	600.6	2.778577
			313 12 42.4	133 12 52.7	Spruce.....	440.9	2.644323
Horseshoe Dune, 1883.....	45 11 32.471	1002.4	283 25 00.2	103 25 21.9	Mullaney.....	687.9	2.837506
	123 57 40.766	889.9	326 53 06.0	146 53 30.6	Barnhart.....	1383.8	3.141072
			330 14 50.0	150 15 12.0	Red Rock.....	1372.0	3.137340
			20 00 44.3	200 00 37.9	Sand Dune.....	576.9	2.761068

Nestugga Bay—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
Hardy Rock, 1883.....	45 11 24.944	770.0	243 04 40.6	63 04 55.5	Horseshoe Dune.....	<i>Meters.</i> 513.2	2.710313
	123 58 01.729	37.8	319 57 21.0	139 57 29.5	Sand Dune.....	404.5	2.606903
Nestugga Bay southeast base, 1883 ...	45 11 47.627	1470.3	324 29 05.5	144 29 20.0	Buckhorn.....	665.4	2.823093
	123 57 30.630	668.6	25 18 37.5	205 18 30.3	Mullaney.....	770.9	2.887000
Drift, 1883.....	45 11 46.288	1429.0	266 13 37.1	86 13 57.5	Horseshoe Dune.....	517.5	2.713941
	123 57 59.368	1295.9	316 24 22.8	136 24 36.0	Nestugga Bay southeast base....	628.6	2.798405
Nestugga Bay northwest base, 1883 ..	45 12 05.779	178.4	328 39 55.5	148 40 06.6	Horseshoe Dune.....	588.9	2.770042
	123 57 46.259	1009.6	353 20 51.1	173 20 55.0	Hardy Rock.....	660.9	2.820134
			25 26 00.4	205 25 51.1	Nestugga Bay southeast base....	656.0	2.816920
					Horseshoe Dune.....	1035.2	3.015015
					Drift.....	666.2	2.823637

Yaquina Bay and River.

<i>Principal points.</i>							
Jet, 1914.....	44 36 59.380	1832.9	173 00 00.2	352 59 56.7	Yaquina Head Lighthouse, old tower.	910.0	2.959026
	124 03 38.692	853.1					
Port, 1914.....	44 37 46.219	1426.7	14 32 09.1	194 31 57.2	Jet.....	1493.6	3.174239
	124 03 21.689	478.1	41 49 59.5	221 49 44.1	Yaquina Head Lighthouse, old tower.	728.3	2.862284
Wire, 1914.....	44 37 10.047	310.1	68 10 01.6	248 09 35.4	Jet.....	885.2	2.947031
	124 03 01.424	31.4	121 36 54.4	301 36 24.7	Yaquina Head Lighthouse, old tower.	1095.0	3.039405
Mack, 1914.....	44 37 38.354	1183.9	59 22 39.6	239 21 52.6	Port.....	1202.6	3.080130
	124 01 54.481	1201.0	97 12 23.1	277 11 21.8	Wire.....	1715.1	3.234282
Yaquina east base, 1914.....	44 37 12.842	396.4	136 10 00.5	316 09 29.0	Port.....	1428.3	3.154827
	124 02 36.813	811.6	229 50 16.0	49 50 45.7	Mack.....	1221.1	3.086746
Yaquina west base, 1914.....	44 37 13.591	419.5	158 50 43.2	338 50 30.8	Port.....	1060.0	3.033404
	124 03 04.008	88.4	243 29 16.8	63 30 05.6	Mack.....	1712.8	3.233702
Hint, 1914.....	44 36 52.370	1616.5	272 12 13.2	92 12 32.3	Yaquina east base.....	600.001	2.778152
	124 01 32.282	711.8	105 31 27.2	285 30 24.6	Wire.....	2039.7	3.309575
Bend, 1914.....	44 37 22.652	699.2	124 34 57.9	304 33 41.0	Port.....	2929.3	3.466760
	124 00 13.509	297.8	160 58 39.9	340 58 24.3	Mack.....	1501.4	3.176503
Quill, 1914.....	44 36 41.359	1276.6	61 43 05.4	241 42 10.1	Hint.....	1972.3	3.294973
	124 00 36.985	815.5	102 17 38.8	282 16 27.9	Mack.....	2278.1	3.357571
Made, 1914.....	44 36 24.105	744.1	105 34 52.9	285 34 14.1	Hint.....	1265.7	3.102346
	124 00 33.521	739.2	135 50 44.2	315 49 49.8	Mack.....	2452.4	3.389592
Case, 1914.....	44 36 22.145	683.6	202 05 58.4	22 06 14.9	Bend.....	1375.7	3.138520
	124 01 04.318	95.2	123 57 36.9	303 56 55.7	Hint.....	1562.1	3.193700
Yaq, 1914.....	44 36 10.802	333.4	171 50 14.4	351 50 12.0	Quill.....	538.1	2.730822
	124 00 33.617	741.4	146 32 28.3	326 32 08.7	Hint.....	1118.3	3.048563
Soft, 1914.....	44 36 05.288	163.2	225 27 31.7	45 27 50.9	Quill.....	845.6	2.927160
	124 00 54.683	1206.0	264 54 25.9	84 54 47.5	Made.....	681.8	2.833678
Out, 1914.....	44 35 51.065	1576.2	117 20 52.5	297 20 31.0	Case.....	762.2	2.882081
	124 00 56.746	1251.6	180 17 43.7	0 17 43.8	Made.....	410.6	2.613489
Wise, 1914.....	44 36 05.288	163.2	157 47 13.1	337 47 06.4	Case.....	562.0	2.749765
	124 00 54.683	1206.0	218 46 47.9	38 47 02.8	Made.....	745.1	2.872200
Log, 1914.....	44 35 51.065	1576.2	249 52 40.0	69 52 54.8	Yaq.....	494.8	2.694409
	124 00 56.746	1251.6	185 55 03.2	5 55 04.6	Soft.....	441.4	2.644835
Et, 1914.....	44 35 44.008	1358.4	219 56 10.3	39 56 26.5	Yaq.....	794.6	2.900150
	124 00 40.514	893.6	121 19 05.4	301 18 54.0	Out.....	419.1	2.622286
Stump, 1914.....	44 35 36.802	1136.0	154 33 34.3	334 33 24.3	Soft.....	727.4	2.861780
	124 01 08.659	191.0	190 25 15.3	10 25 20.1	Yaq.....	840.9	2.924765
Water, 1914.....	44 35 24.093	743.7	210 49 35.2	30 49 43.6	Out.....	512.7	2.709871
	124 00 58.370	1287.5	250 16 56.1	70 17 15.9	Wise.....	659.4	2.819166
Stump, 1914.....	44 35 24.093	743.7	149 57 07.1	320 56 59.9	Log.....	453.2	2.656306
	124 00 58.370	1287.5	182 27 46.3	2 27 47.5	Out.....	833.3	2.920824
Stump, 1914.....	44 35 10.146	313.2	212 38 39.8	32 38 52.4	Wise.....	730.1	2.863381
	124 01 25.169	555.2	203 52 20.9	23 52 32.5	Log.....	899.8	2.954147
Water, 1914.....	44 35 10.103	311.9	233 55 58.4	53 56 17.2	Et.....	731.3	2.864092
	124 01 06.000	132.4	90 10 51.7	270 10 38.3	Stump.....	422.9	2.626203
			175 55 43.5	355 55 41.7	Log.....	826.2	2.917095
			201 17 28.3	21 17 33.7	Et.....	463.5	2.666018

Yaquina Bay and River—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga- rithm.
<i>Principal points—Continued.</i>							
	° ' "		° ' "	° ' "		<i>Meters.</i>	
Mud, 1914.....	44 34 51.468 124 01 13.301	1588.7 293.4	155 34 40.6 195 38 32.2	335 34 32.3 15 38 37.3	Stump..... Water.....	633.2 597.4	2.801544 2.776226
Road, 1914.....	44 35 04.863 124 00 59.534	150.1 1313.3	36 18 01.8 106 05 20.8 138 35 46.3	216 17 52.1 286 05 02.8 318 35 41.7	Mud..... Stump..... Water.....	513.0 588.6 215.7	2.710136 2.769780 2.333769
Caf, 1914.....	44 34 46.812 124 00 56.456	445.0 1245.7	111 08 36.9 173 03 01.7	291 08 25.1 353 02 59.6	Mud..... Road.....	398.5 561.3	2.600388 2.749199
Rail, 1914.....	44 35 02.915 124 00 53.979	90.0 1190.8	6 16 24.6 50 20 41.8 116 07 35.0	186 16 22.9 230 20 28.3 296 07 31.2	Caf..... Mud..... Road.....	500.1 553.7 136.5	2.699028 2.743262 2.135139
Can, 1914.....	44 35 00.617 124 00 11.635	19.0 256.7	66 41 25.5 94 20 49.7	246 40 54.1 274 20 20.0	Caf..... Rail.....	1076.7 936.8	3.032100 2.971652
King, 1914.....	44 34 43.071 124 00 09.783	1329.5 215.8	96 24 11.0 122 08 34.6 175 41 09.3	276 23 38.3 302 08 03.6 355 41 08.0	Caf..... Rail..... Can.....	1036.2 1151.5 543.1	3.015425 3.061251 2.734913
Gravel, 1914.....	44 34 38.197 123 59 53.244	1179.0 1174.7	112 24 34.1 149 37 10.8	292 24 22.5 329 36 57.9	King..... Can.....	394.7 802.2	2.596264 2.904298
Slope, 1914.....	44 34 54.474 123 59 44.435	1681.5 980.3	21 08 46.5 57 48 51.0 107 32 17.3	201 08 40.3 237 48 33.2 287 31 58.2	Gravel..... King..... Can.....	538.7 660.8 629.3	2.731371 2.820055 2.798854
Low, 1914.....	44 34 46.084 123 59 26.353	1422.5 581.4	67 41 21.5 122 59 37.3	247 41 02.6 302 59 24.6	Gravel..... Slope.....	641.3 475.6	2.807054 2.677246
Shell, 1914.....	44 34 31.393 123 59 37.557	969.0 828.7	121 14 50.7 167 58 37.7 208 35 41.1	301 14 39.7 347 58 32.9 28 35 49.0	Gravel..... Slope..... Low.....	404.8 728.4 516.5	2.607255 2.862380 2.713036
Pile, 1914.....	44 34 18.272 123 58 54.185	564.0 1195.6	112 56 37.8 140 25 16.6	292 56 07.3 320 24 54.0	Shell..... Low.....	1039.2 1113.9	3.016680 3.046837
Pine, 1914.....	44 34 34.149 123 59 02.395	1054.1 52.8	83 44 43.5 124 52 33.7 339 42 53.6	263 44 18.8 304 52 16.9 159 42 59.4	Shell..... Low..... Pile.....	780.5 644.3 522.5	2.892348 2.809083 2.718086
Cut, 1914.....	44 34 31.993 123 58 40.153	987.5 885.9	36 10 11.5 97 43 37.0	216 10 01.7 277 43 21.4	Pile..... Pine.....	524.6 495.2	2.719857 2.694812
Clay, 1914.....	44 34 17.817 123 58 34.134	550.0 753.2	91 49 12.6 128 57 28.3 163 07 03.1	271 48 58.6 308 57 08.5 343 06 58.9	Pile..... Pine..... Cut.....	442.7 801.9 457.3	2.646071 2.904101 2.660186
Shelf, 1914.....	44 34 17.374 123 58 04.797	536.3 105.8	91 12 40.3 120 02 57.4	271 12 19.7 300 02 32.6	Clay..... Cut.....	647.5 901.2	2.811220 2.954825
Boone, 1914.....	44 34 31.422 123 58 14.614	969.9 322.4	45 43 27.4 91 47 31.6 333 27 18.8	225 43 13.7 271 47 13.7 153 27 25.7	Clay..... Cut..... Shelf.....	601.6 563.8 454.7	2.779277 2.751090 2.685486
Slue, 1914.....	44 34 35.460 123 57 57.596	1094.6 1270.8	15 53 09.8 71 38 14.4	195 53 04.7 251 38 02.4	Shelf..... Boone.....	580.4 395.6	2.763749 2.597272
Wharf, 1914.....	44 34 30.696 123 57 38.311	947.5 845.3	54 52 14.4 91 36 23.6 109 04 02.8	234 51 55.8 271 35 58.1 289 03 49.3	Shelf..... Boone..... Slue.....	714.6 801.3 450.2	2.854044 2.903791 2.653404
Slip, 1914.....	44 34 48.034 123 57 30.398	1482.7 670.6	18 04 00.3 57 06 24.3	198 03 54.7 237 06 05.2	Wharf..... Slue.....	562.9 714.7	2.750466 2.854091
Hill, 1914.....	44 34 50.357 123 57 56.532	1554.4 1247.2	2 55 19.1 277 05 07.4 326 28 35.7	182 55 18.3 97 05 25.7 146 28 48.4	Slue..... Slip..... Wharf.....	460.4 581.0 728.0	2.663159 2.764183 2.862108
Red, 1914.....	44 35 08.306 123 57 40.601	256.4 895.6	32 23 19.8 340 12 50.7	212 23 08.6 160 12 57.8	Hill..... Slip.....	656.1 665.0	2.816984 2.822826
Spit, 1914.....	44 35 03.692 123 57 29.410	114.0 648.8	2 34 58.4 55 28 37.0 119 58 53.1	182 34 57.7 235 28 18.0 299 58 45.3	Slip..... Hill..... Red.....	483.8 726.3 285.0	2.684678 2.861096 2.454889
Near, 1914.....	44 35 06.161 123 57 23.533	190.2 519.1	59 33 12.9 99 58 33.9	239 33 08.8 279 58 22.0	Spit..... Red.....	150.4 382.3	2.177220 2.582425
Mill, 1914.....	44 35 12.774 123 57 31.953	394.3 704.9	54 08 18.2 317 42 00.0 348 41 03.2	234 08 12.2 137 42 05.9 168 41 05.0	Red..... Near..... Spit.....	235.4 276.0 285.9	2.371839 2.440903 2.456221
Dead, 1914.....	44 35 22.789 123 57 01.151	703.4 25.4	43 53 26.3 65 32 20.6	223 53 10.6 245 31 59.0	Near..... Mill.....	712.2 746.5	2.852598 2.873019
Alder, 1914.....	44 35 09.653 123 56 58.070	298.0 1281.0	79 08 18.0 97 20 50.8 170 29 10.3	259 08 00.1 277 20 27.0 350 29 08.1	Near..... Mill..... Dead.....	572.0 753.6 411.1	2.757363 2.877155 2.613972
Soap, 1914.....	44 35 17.106 123 56 34.537	528.0 761.8	66 06 16.1 106 38 27.8	246 05 59.6 286 38 09.1	Alder..... Dead.....	567.8 612.7	2.754206 2.787267

Yaquina Bay and River—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Grass, 1914.....	44 35 28.336 123 56 37.852	874.7 834.9	37 43 10.3 71 34 39.2 348 05 12.5	217 42 56.1 251 34 22.8 168 05 14.8	Alder..... Dead..... Soap.....	<i>Meters.</i> 729.0 541.7 354.3	2.862735 2.733753 2.549347
Apple, 1914.....	44 35 37.876 123 56 26.544	1169.1 585.5	15 22 35.1 40 15 58.1	195 22 29.5 220 15 50.2	Soap..... Grass.....	664.9 385.9	2.822773 2.586492
Dark, 1914.....	44 35 33.762 123 56 10.038	1042.1 221.4	46 25 44.2 74 44 01.0 109 13 53.9	226 25 27.0 254 43 41.5 289 13 42.3	Soap..... Grass..... Apple.....	745.9 636.0 385.6	2.872676 2.803427 2.586118
Field, 1914.....	44 35 51.717 123 56 10.006	1596.4 220.7	0 04 21.2 40.29 26.7	180 04 21.2 220 29 15.1	Dark..... Apple.....	554.2 561.8	2.743095 2.749556
Dune, 1914.....	44 35 48.633 123 56 25.472	1501.2 561.8	4 04 23.5 254 24 19.9 323 26 19.7	184 04 22.7 74 24 30.7 143 26 30.5	Apple..... Field..... Dark.....	332.9 354.1 571.5	2.522299 2.549172 2.757011
Hump, 1914.....	44 36 12.664 123 56 39.802	390.9 877.7	314 32 01.7 336 55 15.0	134 32 22.6 156 55 23.1	Field..... Dune.....	921.9 806.3	2.964677 2.906492
Dike, 1914.....	44 36 16.779 123 56 28.863	517.9 636.5	62 13 54.4 331 44 15.3 355 04 49.0	242 13 46.7 151 44 28.5 175 04 51.4	Hump..... Field..... Dune.....	272.6 878.3 872.0	2.435596 2.943642 2.940522
Flat, 1914.....	44 36 37.344 123 56 43.827	1152.7 966.4	332 31 54.9 353 21 17.8	152 32 05.4 173 21 20.6	Dike..... Hump.....	715.4 767.0	2.854562 2.884772
High, 1914.....	44 36 35.918 123 56 55.576	1108.7 1225.5	260 21 27.8 315 04 47.2 334 08 37.2	80 21 36.1 135 05 06.0 154 08 48.3	Flat..... Dike..... Hump.....	262.8 834.3 797.6	2.419614 2.921307 2.901805
Saw, 1914.....	44 36 59.092 123 56 52.444	1824.0 1156.3	5 30 56.6 344 11 46.4	185 30 54.3 164 11 52.4	High..... Flat.....	718.6 697.7	2.856512 2.843650
Launch, 1914.....	44 36 51.500 123 56 35.282	1589.7 777.9	23 19 35.2 42 56 12.1 121 46 18.0	203 19 29.2 222 55 57.8 301 46 06.0	Flat..... High..... Saw.....	475.8 657.0 445.1	2.677471 2.817531 2.648442
City, 1914.....	44 37 07.483 123 56 11.191	231.0 246.7	47 06 59.8 74 06 32.3	227 06 42.9 254 06 03.4	Launch..... Saw.....	724.9 945.7	2.860299 2.975753
Last, 1914.....	44 37 17.287 123 56 35.029	533.6 772.3	34 21 36.0 299 55 51.7 0 24 05.2	214 21 23.8 119 56 08.4 180 24 05.0	Saw..... City..... Launch.....	680.3 606.5 796.0	2.832714 2.782800 2.900904
<i>Supplementary points.</i>							
Sea, 1914.....	44 35 58.627 124 03 52.983	1809.7 1168.5	184 12 08.5 189 32 16.4 191 44 01.4	4 12 15.0 9 32 26.4 11 44 23.3	Yaquina Head Lighthouse, old tower. Jet..... Port.....	2786.0 1901.6 3392.1	3.444978 3.279120 3.530462
Yaquina Jetty light, 1914.....	44 36 55.552 124 03 51.339	1714.7 1131.9	189 20 12.3 247 02 06.3 247 52 16.6	9 20 17.7 67 02 15.2 67 52 51.7	Yaquina Head Lighthouse, old tower. Jet..... Wire.....	1035.1 302.9 1188.0	3.014966 2.481248 3.074817
Wet, ¹ 1914.....	44 37 09.24 124 03 55.29	285.2 1299.0	263 12 50 309 44 13	83 13 26 129 44 25	Yaquina west base..... Jet.....	1138.6 475.9	3.056351 2.677493
Round, ¹ 1914.....	44 37 02.91 124 03 29.32	89.8 646.4	158 12 28 187 10 07	338 12 18 7 10 13	Yaquina Head Lighthouse, old tower. Port.....	855.4 1347.4	2.932170 3.129507
Pavilion, 1914.....	44 37 11.350 124 03 07.021	350.3 154.8	62 07 07.8 123 24 49.3 163 16 47.9	242 06 45.5 303 24 23.5 343 16 37.5	Jet..... Yaquina Head Lighthouse, old tower. Port.....	790.0 969.3 1123.9	2.897619 2.986452 3.050719
Mast, 1914.....	44 37 27.217 124 03 32.912	840.1 725.6	289 43 51.7 303 25 29.6 8 26 03.8	109 44 31.1 123 25 49.9 188 25 59.8	Yaquina east base..... Yaquina west base..... Jet.....	1314.0 763.5 868.7	3.118580 2.882826 2.938853
Boathouse, east gable, 1914.....	44 37 31.140 124 03 23.134	961.2 510.0	298 56 28.8 322 06 04.1 19 17 03.9	118 57 01.3 142 06 17.5 199 16 53.0	Yaquina east base..... Yaquina west base..... Jet.....	1167.0 686.5 1038.6	3.067056 2.836610 3.016454
Dry, 1914.....	44 37 18.608 124 03 47.149	574.4 1039.4	193 42 33.9 279 15 20.7 342 33 32.1	13 42 36.3 99 14 50.9 162 33 38.0	Yaquina Head Lighthouse, old tower. Yaquina west base..... Jet.....	318.8 963.7 622.1	2.503446 2.983950 2.793873
Old hotel, northeast corner, 1914.....	44 37 35.745 124 03 22.456	1103.4 495.0	267 36 45.9 298 51 11.3 329 41 29.2	87 37 47.7 118 52 28.7 149 41 44.0	Mack..... llint..... Wire.....	1941.0 2773.5 918.8	3.288023 3.443029 2.963216
Nye, ¹ 1914.....	44 38 01.53 124 03 38.76	47.2 854.3	321 28 46 6 08 57	141 28 58 186 08 53	Port..... Yaquina Head Lighthouse, old tower.	604.2 1021.2	2.781186 3.009129
Bridge, 1914.....	44 37 55.902 124 02 55.950	1725.5 1233.3	4 52 21.4 7 44 44.1 342 23 19.6	184 52 17.6 187 44 38.4 162 23 33.0	Wire..... Yaquina west base..... Yaquina east base.....	1420.6 1318.1 1394.5	3.152468 3.119940 3.144419

¹ No check on this position.

Yaquina Bay and River—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-ritbm.
<i>Supplementary points—Continued.</i>							
Middle Ground light, 1914.....	44 37 49.710 124 02 54.542	1534.4 1202.3	7 03 52.6 10 36 09.9 341 02 41.4	187 03 47.9 190 36 03.3 161 02 53.9	Wire..... Yaquina west base..... Yaquina east base.....	Meters. 1233.7 1134.3 1203.3	3.091204 3.054720 3.080357
House, large green, cupola, 1914.....	44 37 59.030 124 02 51.330	1822.1 1131.4	8 22 23.5 29 33 38.2 347 20 52.8	188 22 16.4 209 33 04.9 167 21 02.9	Wire..... Jet..... Yaquina east base.....	1528.3 2116.6 1461.2	3.184200 3.325644 3.164694
Yaquina Bar front range light, 1914...	44 37 27.031 124 02 38.741	834.4 854.1	53 19 20.6 122 02 07.5 354 27 07.7	233 19 02.9 302 01 37.4 174 27 09.1	Yaquina west base..... Port..... Yaquina east base.....	694.5 1116.7 440.0	2.841687 3.047945 2.643483
Yaquina Bar rear range light, 1914...	44 37 39.468 124 02 02.442	1218.3 53.8	42 40 41.9 55 04 26.2 335 25 08.1	222 40 17.7 235 03 44.8 155 25 29.3	Yaquina east base..... Wire..... Hint.....	1117.9 1586.0 1598.6	3.048388 3.200314 3.203752
Phone, 1914.....	44 37 21.006 124 02 12.170	648.4 268.3	65 07 15.3 78 40 49.4 216 03 40.8	245 06 58.0 258 40 13.0 36 03 53.2	Yaquina east base..... Yaquina west base..... Mack.....	598.9 1165.5 662.5	2.777331 3.066518 2.821155
Back, 1914.....	44 36 43.288 124 02 20.965	1336.2 462.2	145 25 56.0 159 02 36.2 198 57 21.9	325 25 13.4 339 02 25.1 18 57 40.5	Port..... Yaquina east base..... Mack.....	2359.2 976.9 1797.2	3.372758 2.989851 3.254606
Beacon 8, 1914.....	44 37 06.274 124 01 41.297	193.7 910.5	99 24 41.1 163 38 38.2 255 21 09.8	279 24 02.1 343 38 28.9 75 22 11.5	Yaquina east base..... Mack..... Bend.....	1240.6 1032.0 2000.4	3.093648 3.013683 3.301113
Beacon 10, 1914.....	44 36 48.800 124 01 07.995	1506.3 176.3	101 37 44.9 288 33 55.1 354 22 18.0	281 37 27.9 108 34 16.9 174 22 20.6	Hint..... Quill..... Case.....	546.7 721.3 826.8	2.737762 2.858119 2.917380
Old Rock, 1914.....	44 36 42.525 124 00 43.170	1312.6 951.9	36 33 08.8 105 40 51.6 339 28 53.2	216 32 54.0 285 40 17.2 159 29 00.0	Case..... Hint..... Made.....	783.1 1124.7 607.1	2.893796 3.051044 2.783245
Coquille Point light, 1914.....	44 36 39.268 124 00 42.021	1212.1 926.6	42 55 59.8 110 03 13.5 338 10 24.0	222 55 44.2 290 02 38.3 153 10 30.0	Case..... Hint..... Made.....	721.9 1179.7 504.2	2.858454 3.071777 2.702584
Beacon 12, 1914.....	44 36 35.056 124 00 54.622	1082.1 1204.4	28 12 51.5 122 46 05.5 305 59 48.7	208 12 44.7 302 45 39.1 126 00 00.5	Case..... Hint..... Made.....	452.3 987.5 575.1	2.655396 2.994536 2.759776
Far, ¹ 1914.....	44 36 31.72 124 01 53.52	979.1 1180.2	234 30 12 259 59 43	54 31 22 80 00 36	Bend..... Quill.....	2708.1 1713.6	3.432060 3.23911
Full, 1914.....	44 37 46.958 124 01 13.609	1449.5 300.0	13 43 53.4 299 30 59.4 338 15 24.4	193 43 40.3 119 31 41.6 158 15 50.1	Hint..... Bend..... Quill.....	1734.5 1522.5 2179.9	3.239185 3.182569 3.338435
Chnrcb, flagstaff, 1914.....	44 36 31.204 124 00 30.565	963.2 674.0	6 06 02.3 33 37 15.7 69 24 45.1	186 06 00.1 213 36 58.7 249 24 21.4	Yaq..... Soft..... Case.....	633.3 960.6 795.1	2.801640 2.982556 2.900430
Shade, 1914.....	44 35 21.740 124 01 24.196	671.1 533.7	216 23 40.0 262 43 57.5 345 34 24.9	36 23 50.9 82 44 15.6 165 34 32.5	Log..... Et..... Mud.....	577.6 574.3 964.9	2.761623 2.759136 2.984459
Old wharf, 1914.....	44 35 01.569 124 00 15.411	48.4 340.0	63 17 58.4 325 51 57.1 347 43 54.3	243 17 29.6 145 52 12.6 167 43 58.2	Caf..... Gravel..... King.....	1013.6 871.6 584.3	3.005874 2.940300 2.766653
Schoolhouse, chimney, ¹ 1914.....	44 34 40.88 124 00 14.06	1261.9 310.2	185 00 48 237 17 48	5 00 50 57 18 09	Can..... Slope.....	611.5 776.6	2.786398 2.890202
Hill (U. S. E.), ¹ 1914.....	44 34 34.47 123 59 02.91	1064.0 64.2	310 39 08	130 39 08	Pine.....	15.1	1.17840
Old House, 1914.....	44 34 15.118 123 59 00.354	466.7 7.8	121 28 20.7 141 19 29.7 149 02 02.8	301 27 54.6 321 18 58.8 329 01 44.6	Shell..... Slope..... Low.....	962.4 1556.2 1114.8	2.983356 3.192061 3.047188
Front Range 1, 1914.....	44 34 17.318 123 58 29.178	534.6 643.8	125 20 06.2 151 52 22.0 216 25 46.9	305 19 42.9 331 52 14.3 36 25 57.1	Pine..... Cut..... Boone.....	898.4 513.6 541.1	2.953458 2.710656 2.733291
Rear Range 1, 1914.....	44 34 16.745 123 58 27.546	516.9 607.8	124 56 39.4 149 25 05.1 212 12 10.8	304 56 15.0 329 24 56.3 32 12 19.9	Pine..... Cut..... Boone.....	938.0 546.7 535.4	2.972199 2.737750 2.728692
Front Range 2, 1914.....	44 34 59.590 123 57 51.485	1839.4 1135.8	21 20 27.0 226 37 56.8 255 25 20.0	201 20 23.5 46 38 10.5 75 25 35.5	Hill..... Mill..... Spit.....	306.0 592.7 503.2	2.485691 2.772834 2.701730
Rear Range 2, 1914.....	44 34 56.903 123 58 00.511	1756.4 11.3	231 17 21.7 250 41 26.5 253 00 46.1	51 17 35.7 70 41 52.4 73 01 07.9	Red..... Near..... Spit.....	562.9 864.4 717.4	2.750401 2.936703 2.855768
Rock (U. S. E.), ¹ 1914.....	44 35 06.91 123 57 42.32	213.3 983.6	221 25 58	41 25 59	Red.....	57.3	1.75838

¹ No check on this position.

Yaquina Bay and River—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
Mill 4 (U. S. E.), ¹ 1914.....	44 35 10.87 123 57 35.46	735.5 782.2	232 48 26	52 48 28	Mill.....	Meters. 97.1	1.98713
Front Range 3, 1914.....	44 35 36.759 123 56 10.739	1134.7 236.9	350 30 17.9 95 39 11.7 133 26 39.8	170 30 18.4 275 39 00.6 318 26 29.5	Dark..... Apple..... Dune.....	93.8 350.3 489.8	1.972127 2.544440 2.690054
Rear Range 3, 1914.....	44 35 42.803 123 56 04.833	1321.2 106.6	58 29 19.8 72 22 59.9 111 34 24.1	238 28 56.6 252 22 44.6 291 34 09.6	Grass..... Apple..... Dune.....	854.3 502.4 489.5	2.931614 2.701083 2.689750
Front Range 5, 1914.....	44 35 38.200 123 56 06.411	1179.1 141.4	30 16 55.8 88 42 42.4 127 27 19.0	210 16 53.2 263 42 28.2 307 27 05.6	Dark..... Apple..... Dune.....	158.6 444.2 529.6	2.200424 2.647555 2.723932
Rear Range 5, ¹ 1914.....	44 35 35.88 123 56 04.39	1107.5 96.8	130 15 00 165 47 15	310 14 45 345 47 11	Dune..... Field.....	609.1 504.2	2.784694 2.702575
Hanson (U. S. E.), ¹ 1914.....	44 35 38.84 123 56 26.82	1198.8 591.6	348 33 36	168 33 36	Apple.....	30.2	1.47986
Front Range 4, 1914.....	44 35 43.012 123 56 10.750	1327.7 237.1	356 51 14.6 118 07 10.3 183 29 28.8	176 51 15.1 295 07 00.0 3 29 29.3	Dark..... Dune..... Field.....	286.0 368.2 269.2	2.456308 2.566046 2.430085
Rear Range 4, 1914.....	44 35 49.005 123 56 08.465	1512.7 186.7	4 13 00.9 88 14 52.5 157 54 04.1	184 12 59.8 268 14 40.6 337 54 03.0	Dark..... Dune..... Field.....	471.8 375.3 90.4	2.673763 2.574343 1.955906
Front Range 6, 1914.....	44 35 56.291 123 56 15.214	1737.6 335.5	43 44 56.5 132 59 12.8 154 32 54.4	223 44 49.3 312 58 55.4 334 32 44.8	Dune..... Hump..... Dike.....	327.2 741.3 700.4	2.514814 2.869984 2.845357
Rear Range 6, 1914.....	44 36 04.267 123 56 16.512	131.7 364.2	22 16 10.5 116 46 44.4 144 48 30.1	202 16 04.2 296 46 27.9 324 48 21.4	Dune..... Hump..... Dike.....	521.5 575.3 472.6	2.717232 2.759910 2.674496
Barn (U. S. E.), ¹ 1914.....	44 36 10.055 123 56 38.242	310.4 843.4	156 52 13	336 52 12	Hump.....	87.6	1.94241
Front Range 7, 1914.....	44 36 32.183 123 56 53.442	993.4 1178.5	233 04 58.6 311 15 24.8 333 28 10.6	53 05 05.4 131 15 42.1 153 28 20.2	Flat..... Dike..... Hump.....	265.2 721.0 673.4	2.423564 2.857949 2.828290
Rear Range 7, 1914.....	44 36 33.734 123 56 54.794	1041.3 1208.2	245 15 33.4 312 27 46.6 333 03 13.4	65 15 41.1 132 28 04.8 153 03 23.9	Flat..... Dike..... Hump.....	266.3 775.2 729.6	2.425324 2.889390 2.863068
Front Range 8, 1914.....	44 36 48.301 123 56 57.305	1490.9 1263.5	258 30 09.4 318 41 33.2 340 39 52.2	78 30 24.9 138 41 42.7 160 40 04.5	Launch..... Flat..... Hump.....	495.5 450.2 1165.8	2.695067 2.653431 3.066608
Rear Range 8, 1914.....	44 36 49.474 123 56 57.847	1527.1 1275.5	262 49 59.5 320 27 11.5 340 41 52.6	82 50 15.3 140 27 21.3 160 42 05.2	Launch..... Flat..... Hump.....	501.5 485.6 1203.9	2.700237 2.686234 3.080585
Lower Dike Light, 1914.....	44 35 52.521 123 56 21.371	1621.2 471.3	37 00 09.7 275 39 04.1 336 38 56.6	217 00 06.9 95 39 12.1 156 39 04.6	Dune..... Field..... Dark.....	150.3 251.9 630.7	2.176852 2.401211 2.799822
Toledo Beacon 10, 1914.....	44 36 53.328 123 56 51.569	1646.1 1137.0	9 20 14.9 278 55 33.4 340 54 46.5	189 20 12.0 98 55 44.8 160 54 51.9	High..... Launch..... Flat.....	544.6 363.5 522.1	2.736077 2.560530 2.717731
Toledo Beacon 12, 1914.....	44 36 58.111 123 56 42.649	1793.7 940.3	22 35 34.6 321 28 38.1 2 19 10.7	202 35 25.5 141 28 43.3 182 19 09.9	High..... Launch..... Flat.....	742.0 260.8 641.5	2.870382 2.416342 2.807225
Stream, 1914.....	44 36 47.064 123 56 09.334	1452.7 205.8	103 27 51.6 111 20 27.3 148 44 02.8	283 27 33.3 291 19 57.0 328 43 44.7	Launch..... Saw..... Last.....	588.3 1020.5 1091.5	2.769594 3.008798 3.038006
Day Beacon, 1914.....	44 36 57.606 123 56 33.446	1778.1 737.4	96 15 17.7 176 42 41.7 238 08 28.8	276 15 04.4 356 42 40.6 58 08 44.4	Saw..... Last..... City.....	421.4 608.5 577.7	2.624677 2.784275 2.761696
Hog, 1914.....	44 36 58.546 123 56 20.945	1807.1 461.8	55 28 36.2 151 46 34.4 217 56 09.8	235 28 26.1 331 46 21.5 37 56 16.6	Launch..... Last..... City.....	383.7 656.6 349.8	2.583978 2.817282 2.543824
Front Range 9, 1914.....	44 37 03.041 123 56 42.423	93.9 935.3	61 05 49.3 200 29 22.2 336 09 24.7	241 05 42.3 190 20 27.4 156 09 29.7	Saw..... Last..... Launch.....	252.4 489.0 389.5	2.402000 2.671132 2.590492
Rear Range 9, 1914.....	44 37 03.868 123 56 41.557	119.4 916.2	58 26 38.7 199 09 34.8 340 04 45.6	238 26 31.1 19 09 39.4 160 04 50.0	Saw..... Last..... Launch.....	281.7 438.5 406.1	2.449781 2.641955 2.608591
Depot Slough light, 1914.....	44 36 55.866 123 56 20.018	1724.4 441.4	68 10 48.7 153 24 45.0 208 29 25.7	248 10 38.0 333 24 34.5 28 29 31.9	Launch..... Last..... City.....	362.5 739.4 408.0	2.559335 2.868884 2.610666

¹ No check on this position.

Yaquina Bay and River—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Supplementary points—Continued.</i>							
Front Range 11, 1914.....	44 36 55.482	1712.6	74 46 11.3	254 45 56.9	Launch.....	<i>Meters.</i> 467.8	2.670051
	123 56 14.811	326.6	97 39 10.8	277 38 44.4	Saw.....	837.2	2.922823
			146 29 10.9	326 28 56.7	Last.....	807.3	2.907024
Rear Range 11, 1914.....	44 36 54.909	1694.9	78 34 41.8	258 34 25.2	Launch.....	531.2	2.725282
	123 56 11.666	257.2	98 10 35.6	278 10 07.0	Saw.....	908.3	2.958235
			143 17 23.5	323 17 07.1	Last.....	861.7	2.935332
Front Range 10, 1914.....	44 37 02.513	77.6	5 01 19.1	185 01 18.1	Launch.....	341.3	2.533075
	123 56 33.927	748.0	75 29 58.2	255 29 45.2	Saw.....	421.7	2.624997
			252 58 57.2	72 59 13.1	City.....	524.2	2.719522
Rear Range 10, 1914.....	44 37 03.126	96.5	9 56 08.2	189 56 06.2	Launch.....	364.3	2.561478
	123 56 32.431	715.0	74 14 38.0	254 14 24.0	Saw.....	458.5	2.661314
			253 58 26.7	73 58 41.6	City.....	487.2	2.687732
Courthouse, flagstaff, 1914.....	44 37 12.863	397.0	43 32 56.6	223 32 36.6	Launch.....	909.8	2.958930
	123 56 06.854	151.1	67 04 51.5	247 04 19.5	Saw.....	1091.3	3.037955
			102 24 02.7	282 23 42.9	Last.....	636.0	2.803452
Schoolhouse, cupola, 1914.....	44 37 09.277	286.4	61 59 21.1	241 58 48.2	Launch.....	1168.2	3.067520
	123 55 48.506	1069.4	77 26 03.6	257 25 18.7	Saw.....	1444.3	3.159660
			103 33 27.1	283 32 54.4	Last.....	1055.1	3.023277

Heceta Head and Siuslaw River.

<i>Principal points.</i>	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
Spur, 1908.....	43 57 44.180	1363.6	175 06 51.9	355 06 09.1	Cape.....	16081.6	4.206330
	124 04 08.145	181.6	186 10 46.6	6 12 16.2	Fairview.....	26567.8	4.424355
			318 58 42.8	139 01 32.9	Maple.....	8337.7	3.921044
Cannery Hill, 1883.....	44 00 21.222	655.0	195 14 46.1	15 16 21.4	Cape.....	11584.5	4.063879
	124 07 26.701	594.8	317 35 09.3	137 37 27.2	Spur.....	6563.1	3.817106
Sugar Leaf 2, 1908.....	44 01 35.767	1103.9	200 13 36.5	20 15 18.8	Cape.....	9459.5	3.975869
	124 07 36.780	819.1	326 56 23.4	146 58 48.3	Spur.....	8526.5	3.930772
			354 25 33.1	174 25 40.1	Cannery Hill.....	2311.7	3.363982
Green, 1908.....	44 00 06.525	201.4	97 08 11.0	277 06 17.8	Cannery Hill.....	3659.4	3.563407
	124 04 43.714	973.9	125 33 43.7	305 31 43.4	Sugar Leaf 2.....	4737.9	3.675589
			177 09 07.3	357 08 49.3	Cape.....	11644.2	4.066108
High Bald Peak, 1908.....	44 16 41.73	1288.0	75 47 02	255 29 15	Spur.....	4464.3	3.649749
	123 36 28.88	640.2	81 26 59	261 10 54	Fairview.....	35057.5	4.544781
			138 36 42	318 26 48	Cummins.....	31009.4	4.491494
Cape Ridge, 1908.....	44 05 51.56	1591.4	21 23 12	201 21 07	Table.....	28367.4	4.452819
	124 04 27.49	611.5	28 06 15	208 04 03	Cannery Hill.....	10948.4	4.039352
			175 29 49	355 29 33	Sugar Leaf 2.....	8948.7	3.951760
Snag, 1908.....	44 09 22.114	682.6	217 57 25.3	37 59 24.6	Snag.....	6518.9	3.814172
	124 04 50.524	1122.8	4 25 32.0	184 25 18.7	Fairview.....	6179.7	3.790966
					Cape.....	5534.8	3.743102
Loaf, 1908.....	44 09 23.188	715.7	270 41 13.6	90 42 38.8	Snag.....	2717.8	3.434225
	124 06 52.822	1173.9	337 33 25.9	157 34 27.7	Cape.....	6006.0	3.778582
Plateau, 1908.....	44 11 57.592	1777.6	268 59 10.4	89 01 21.5	Fairview.....	4175.5	3.620704
	124 05 07.361	163.4	355 32 30.9	175 32 42.6	Snag.....	4813.4	3.682452
			26 11 14.2	206 10 00.7	Loaf.....	5310.3	3.723123
Heceta, 1908.....	44 08 26.001	802.5	201 23 14.7	21 23 36.4	Loaf.....	1895.6	3.277758
	124 07 23.931	531.9	243 03 19.1	63 05 06.0	Snag.....	3824.1	3.582526
Turn, 1908.....	44 07 57.794	1783.9	176 39 52.7	356 39 51.1	Heceta.....	872.1	2.940561
	124 07 21.648	481.2	232 12 58.1	52 14 43.3	Snag.....	4249.1	3.628302
Tree, 1908.....	44 08 22.366	690.3	38 30 50.9	218 30 32.0	Turn.....	969.2	2.986432
	124 06 54.498	1211.4	99 44 03.8	279 43 43.3	Heceta.....	663.8	2.822017
			181 08 12.8	1 08 14.0	Loaf.....	1877.6	3.273612
Head, 1908.....	44 08 18.316	565.3	236 11 37.0	56 13 03.4	Snag.....	3315.5	3.520546
	124 07 36.757	817.0	230 14 19.3	50 14 28.2	Heceta.....	370.9	2.569206
			332 03 55.1	152 04 05.6	Turn.....	717.0	2.855489
<i>Supplementary points.</i>							
Heceta Head Lighthouse, 1908.....	44 08 16.371	505.3	211 17 07.6	31 17 08.8	Head.....	70.2	1.846632
	124 07 38.398	853.5	227 15 06.0	47 15 16.1	Heceta.....	437.9	2.641366
			327 00 01.6	147 00 13.3	Turn.....	683.7	2.834847
Rock, southerly of two, south of light-house, 1908.....	44 08 09.157	282.6	192 19 24	12 19 26	Head.....	289.4	2.461453
	124 07 39.535	878.8	213 42 30	33 42 41	Heceta.....	625.0	2.795863
			311 24 43	131 24 58	Turn.....	530.2	2.724436
Keeper's house, chimney, ¹ 1908.....	44 08 13.38	412.9	342 00 10	162 00 15	Turn.....	505.8	2.703943
	124 07 28.68	637.5	130 19 15	310 19 09	Head.....	235.5	2.372064

¹ No check on this position.

Umpqua River.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points.</i>							
Umpqua River Lighthouse, 1908.....	43 39 45.935 124 11 51.518	1417.7 1154.3	196 34 25.0 188 00 37.4 202 44 43.6	6 34 43.1 8 00 49.3 22 45 53.1	Cab..... Beach 1908..... Sand Hill 2.....	Meters. 5117.5 2776.5 5829.5	3.709058 3.443505 3.765623
Wind, 1908.....	43 41 49.083 124 11 03.340	1514.8 74.8	33 21 38.7 158 59 29.3	213 21 17.4 338 59 14.1	Beach, 1908..... Cab.....	1258.6 1374.6	3.099877 3.138163
Bench, 1908.....	43 41 21.728 124 10 19.975	670.6 447.4	82 54 50.5 131 00 19.8	262 53 59.2 310 59 49.8	Beach..... Wind.....	1676.1 1286.8	3.224311 3.109516
Brushy Hill 2, 1908.....	43 43 47.951 124 10 20.229	1479.9 452.8	238 01 20.0 286 03 06.4	53 04 55.6 106 04 44.4	Trail..... Burn.....	8216.8 3300.4	3.914704 3.518561
Cab, 1908.....	43 42 30.660 124 11 25.351	946.3 567.6	211 25 23.1 252 20 30.4	31 26 08.1 72 22 53.4	Brushy Hill 2..... Burn.....	2795.6 4858.3	3.446471 3.686482
Sand Hill 2, 1908.....	43 42 40.118 124 10 10.844	1238.2 242.8	80 04 53.5 174 16 13.4	260 04 02.0 354 16 06.9	Cab..... Brushy Hill 2.....	1693.4 2104.0	3.228771 3.322871
Beach, 1908.....	43 41 15.022 124 11 34.242	463.6 766.9	184 52 27.0 199 20 18.3 215 24 27.5	4 52 33.1 19 21 09.4 35 25 25.1	Cab..... Brushy Hill 2..... Sand Hill 2.....	2342.9 5002.2 3222.6	3.369748 3.699165 3.508202
Snipe, 1885.....	43 38 54.357 124 12 31.160	1677.6 968.3	337 16 54.1 8 06 06.3	157 17 29.1 188 05 56.8	Faun 2..... Bear.....	2947.8 2184.9	3.469495 3.339437
Deer, 1885.....	43 39 15.509 124 11 53.968	478.6 1209.3	354 50 19.8 2 06 40.8 22 04 14.9 51 56 05.0	174 50 29.2 182 06 35.4 202 03 39.7 231 55 39.3	Faun 2..... Hammock..... Bear..... Snipe.....	3385.7 4714.0 3038.5 1058.7	3.529648 3.673390 3.482658 3.024774
South Point 2, 1885.....	43 39 45.925 124 12 19.512	1417.3 437.2	328 37 27.3 8 37 05.7 9 18 53.9	148 37 44.9 188 36 48.1 189 18 45.8	Deer..... Bear..... Snipe.....	1099.4 3797.5 1612.8	3.041175 3.579496 3.207573
Beach, 1885.....	43 42 53.711 124 11 19.982	1657.7 447.3	319 21 14.0 9 04 30.3	139 21 56.3 189 04 21.0	Army Hill..... Umpqua north base.....	2105.2 1916.4	3.323284 3.282482
Sand Hill 3, 1885.....	43 42 39.322 124 10 10.561	1213.6 236.4	52 03 02.0 105 57 14.0	232 02 04.7 285 56 26.0	Umpqua north base..... Beach 1885.....	2354.7 1616.3	3.371933 3.208533
Dune, 1885.....	43 43 31.358 124 11 05.536	967.8 123.9	322 31 55.3 339 12 20.8 11 34 42.1 15 33 13.1	142 32 33.3 159 12 53.1 191 34 22.8 195 33 03.1	Sand Hill 3..... Army Hill..... Umpqua north base..... Beach 1885.....	2023.3 2951.5 3117.7 1206.0	3.306052 3.470036 3.498332 3.081356
Lake View, 1885.....	43 39 25.680 124 11 49.137	792.5 1101.1	19 01 39.5 44 15 14.3 132 33 16.4	199 01 36.2 224 14 45.4 312 32 55.5	Deer..... Snipe..... South Point 2.....	332.0 1349.6 923.9	2.521195 3.130199 2.965632
Stage Landing, 1885.....	43 40 11.138 124 11 43.778	343.7 980.8	4 53 30.7 45 49 06.2	184 53 27.0 225 48 41.6	Lake View..... South Point 2.....	1408.1 1116.5	3.148626 3.047843
Umpqua south base, 1885.....	43 41 13.775 124 11 33.381	425.1 747.6	6 02 27.4 6 52 13.6 20 52 06.9	186 02 16.5 186 52 06.4 200 51 35.1	Lake View..... Stage Landing..... South Point 2.....	3354.7 1947.1 2901.5	3.525652 3.289388 3.462627
Umpqua north base, 1885.....	43 41 52.394 124 11 33.480	1617.0 749.7	359 53 35.1 4 13 19.5 14 43 07.0	179 53 35.2 184 13 12.4 194 47 35.3	Umpqua south base..... Stage Landing..... South Point 2.....	1191.9 3133.5 4037.0	3.076229 3.496029 3.606062
Army Hill, 1885.....	43 42 01.952 124 10 13.742	60.2 419.7	29 07 17.8 48 21 10.1 80 00 39.4	209 06 19.1 228 20 18.6 259 59 47.8	Stage Landing..... Umpqua north base..... Umpqua north base.....	3914.5 2237.1 1699.4	3.592681 3.349633 3.230284
Brushy Hill, 1885.....	43 43 47.742 124 10 20.238	1473.5 453.0	354 08 32.9 359 24 45.0 38 44 03.2 63 29 49.5	174 08 39.6 179 24 46.0 218 43 21.9 243 29 18.2	Sand Hill 3..... Army Hill..... Beach 1885..... Dune.....	2122.7 3265.1 2137.5 1133.0	3.326888 3.513898 3.329911 3.054217
Carson Tree, 1885.....	43 44 53.861 124 10 11.443	1646.9 256.0	359 43 35.9 1 46 11.1 18 12 28.3 22 33 51.4	179 43 36.5 181 46 06.0 198 11 31.6 202 33 04.0	Sand Hill 3..... Army Hill..... Umpqua north base..... Beach 1885.....	4136.8 5292.6 5879.2 3998.6	3.616669 3.723673 3.769320 3.601911
Diercks, 1885.....	43 45 02.976 124 10 39.548	91.8 884.8	295 15 39.9 12 47 01.9	115 15 59.3 192 46 33.9	Carson Tree..... Beach 1885.....	685.3 4090.8	2.842177 3.611808
Wreck Tacoma, 1885.....	43 45 01.959 124 11 12.747	60.5 285.2	267 34 34.5 356 41 48.0 2 20 35.6	87 32 57.5 176 41 53.0 182 20 30.7	Diercks..... Dune..... Beach 1885.....	743.4 2800.8 3961.4	2.871247 3.447289 3.597945
Schroeder, 1885.....	43 46 04.538 124 10 31.411	140.1 702.6	348 30 14.7 5 28 23.1 25 35 16.3	168 30 28.5 153 28 17.5 205 34 47.6	Carson Tree..... Diercks..... Wreck Tacoma.....	2241.7 1908.7 2141.3	3.350574 3.280733 3.330683
North End, 1885.....	43 47 03.396 124 10 19.885	104.8 444.7	357 18 19.8 6 45 02.5 8 04 39.1 17 30 51.3	177 18 25.6 189 44 49.0 188 04 31.1 197 30 14.7	Carson Tree..... Diercks..... Schroeder..... Wreck Tacoma.....	4017.7 3742.4 1834.7 3930.0	3.603978 3.573156 3.263573 3.594363
Corral, 1885.....	43 44 07.783 124 08 05.168	240.2 115.7	45 48 16.1 78 26 55.4	225 46 49.4 258 25 22.0	Sand Hill 3..... Brushy Hill.....	3915.5 3085.5	3.592792 3.489323

Umpqua River—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
Cliff, 1885.....	43 44 56.772 124 08 42.607	1752.2 953.3	331 00 22.5 24 54 06.0 45 43 46.5	151 00 48.4 204 53 05.2 225 42 39.0	Corral..... Sand Hill 3..... Brushy Hill.....	1728.5 4676.6 3051.5	3.237674 3.669928 3.484520
Marsh, 1885.....	43 44 56.648 124 07 33.388	1748.3 747.0	25 14 54.1 60 21 02.7 90 08 54.9	205 14 32.1 240 19 07.3 270 08 07.0	Corral..... Brushy Hill..... Cliff.....	1667.4 4296.8 1548.7	3.222028 3.633149 3.189964
Gardiner, 1885.....	43 44 01.299 124 06 32.412	40.1 725.4	95 30 55.6 120 27 13.5 141 23 28.2	275 29 51.5 300 25 43.5 321 22 41.1	Corral..... Cliff..... Marsh.....	2085.4 3379.1 2196.3	3.319195 3.528806 3.339701
Leeds, 1885.....	43 44 04.416 124 07 50.985	136.3 1141.1	144 26 42.8 193 43 28.9 273 07 26.6	324 26 07.1 13 43 41.1 93 08 20.9	Cliff..... Marsh..... Gardiner.....	1986.3 1659.4 1761.0	3.298038 3.219953 3.245769
Umpquah, 1885.....	43 42 33.258 124 06 33.681	1026.4 754.1	148 24 50.4 163 12 11.7 180 85 55.4	328 23 57.0 343 11 30.5 0 35 56.3	Leeds..... Marsh..... Gardiner.....	3302.9 4622.8 2717.3	3.518899 3.664901 3.434144
<i>Supplementary points.</i>							
Breakwater, 1885.....	43 43 18.167 124 06 23.826	560.7 533.4	9 02 43.7 126 12 05.3 134 25 50.2	189 02 36.9 306 11 05.1 314 24 14.3	Umpquah..... Leeds..... Cliff.....	1403.5 2417.2 4348.2	3.147199 3.383315 3.638312
Cannery smokestack, 1885.....	43 43 35.446 124 07 28.478	1094.0 637.4	177 29 24.3 237 32 36.6 327 24 40.5	357 29 20.9 57 33 15.3 147 25 18.4	Marsh..... Gardiner..... Umpquah.....	2508.5 1487.0 2277.8	3.399418 3.172312 3.357515
Mill, smokestack, 1885.....	43 43 54.907 124 06 42.659	1694.6 954.7	355 26 22.1 100 52 15.0 125 26 15.9 149 13 15.8	175 26 28.3 280 51 27.8 305 24 53.0 329 12 40.8	Umpquah..... Leeds..... Cliff..... Marsh.....	2527.9 1557.0 3293.9 2218.0	3.402762 3.192295 3.517710 3.345960
Old Mill smokestack, 1885.....	43 43 37.199 124 06 34.467	1148.1 771.5	116 08 07.1 130 35 25.1 151 44 13.1	296 07 14.2 310 33 56.5 331 43 32.4	Leeds..... Cliff..... Marsh.....	1907.4 3775.4 2784.0	3.280452 3.576965 3.444676
Smith River, ¹ 1885.....	43 42 36.81 124 04 51.80	1136.1 1159.7	87 15 42 121 47 39	267 14 31 301 46 35	Umpquah..... Breakwater.....	2283.5 2423.4	3.358598 3.384433

Umpqua River to Coos Bay.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points.</i>							
Coos Bay Tree, 1885.....	43 26 20.130 124 15 51.313	621.2 1154.0	301 57 58.6 328 27 53.1 19 22 12.8	121 59 38.0 148 28 35.9 199 21 49.1	Simpson..... Pony..... Hutchinson 2.....	3835.9 2678.6 2342.0	3.583867 3.427908 3.369581
Lagoon, 1885.....	43 26 23.693 124 15 05.943	731.2 133.7	313 47 22.2 350 58 11.7 83 51 14.0	133 48 30.5 170 58 23.3 263 50 42.8	Simpson..... Pony..... Coos Bay Tree.....	3094.1 2423.1 1026.2	3.490537 3.384378 3.011236
North Sand 2, 1885.....	43 26 40.240 124 14 10.352	1241.8 232.8	339 39 43.6 16 41 03.0 67 47 07.0 74 43 16.0	159 40 13.6 196 40 36.4 247 46 28.8 254 42 06.6	Simpson..... Pony..... Lagoon..... Coos Bay Tree.....	2828.5 3031.3 1350.4 2353.7	3.451550 3.481635 3.130461 3.371748
Lion Tree, 1885.....	43 27 24.511 124 13 12.767	756.4 287.0	4 26 41.6 43 28 00.5	184 26 32.0 223 27 20.9	Simpson..... North Sand 2.....	4030.6 1882.3	3.605367 3.274692
Late, 1885.....	43 28 09.563 124 13 52.645	295.1 1183.4	327 11 02.2 353 49 48.4 8 13 09.8	147 11 29.6 173 50 06.2 188 12 57.6	Lion Tree..... Simpson..... North Sand 2.....	1654.3 5440.3 2785.2	3.218617 3.735623 3.444859
Unknown, 1885.....	43 27 41.101 124 16 04.873	1268.4 109.6	253 31 28.2 277 31 17.3 306 05 53.1 330 58 44.8 353 02 29.9	73 32 59.2 97 33 15.7 126 07 11.9 150 59 25.5 173 02 39.4	Late..... Lion Tree..... North Sand 2..... Lagoon..... Coos Bay Tree.....	3099.5 3902.9 3187.1 2731.8 2517.4	3.491287 3.591392 3.503400 3.436447 3.400953
Kilstrom, 1885.....	43 28 54.100 124 15 46.205	1669.6 1038.4	298 17 33.8 308 42 10.2 10 33 09.3	118 18 51.9 128 43 55.7 190 32 56.4	Late..... Lion Tree..... Unknown.....	2898.9 4420.4 2291.6	3.462232 3.645458 3.360139
Whale, 1885.....	43 29 58.137 124 15 18.006	1794.2 404.5	330 12 04.4 329 17 29.1 17 46 45.7	150 13 03.1 149 18 55.1 197 46 26.3	Late..... Lion Tree..... Kilstrom.....	3861.0 5513.7 2075.3	3.586699 3.741441 3.317091
Brushy Ridge, 1885.....	43 29 20.395 124 12 07.283	629.4 163.7	47 17 51.2 80 39 14.8 105 13 27.0	227 16 38.6 260 36 44.1 285 11 15.7	Late..... Kilstrom..... Whale.....	3222.7 4986.1 4440.7	3.508214 3.697757 3.647455
Jarvis, 1885.....	43 31 29.889 124 14 39.668	922.4 890.8	319 24 11.7 16 55 09.1 17 16 36.3	139 25 56.6 196 54 42.7 197 15 50.5	Brushy Ridge..... Whale..... Kilstrom.....	5262.0 2669.7 5034.9	3.721152 3.471241 3.701988
Doe, 1885.....	43 31 50.319 124 13 27.797	1552.9 624.2	29 46 14.3 35 34 30.7 68 40 07.9	209 44 39.0 215 33 14.8 248 39 18.4	Kilstrom..... Whale..... Jarvis.....	6264.4 4266.0 1732.7	3.796880 3.629003 3.238728

¹ No check on this position.

Umpqua River to Coos Bay—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Wheeler, 1885.....	43 32 41.926	1293.9	328 06 26.6	148 06 57.0	Doe.....	Meters.	3.273181
	124 14 11.931	267.9	15 39 08.1	165 38 49.0	Jarvis.....	1875.8	3.363377
Camp Hill, 1885.....	43 33 50.406	1555.6	15 42 44.0	198 42 05.5	Doe.....	3912.8	3.592486
	124 12 31.895	715.8	33 29 43.8	213 28 15.8	Jarvis.....	5199.4	3.715956
			46 44 39.8	226 43 30.9	Wheeler.....	3083.6	3.489054
Ten Mile, 1885.....	43 34 20.248	624.9	301 31 21.5	121 32 07.6	Camp Hill.....	1761.2	3.245810
	124 13 38.790	870.4	356 56 46.1	176 56 53.7	Doe.....	4633.6	3.665923
			13 46 35.8	193 46 13.0	Wheeler.....	3124.2	3.494743
Sea Lion, 1885.....	43 35 44.059	1359.7	345 13 33.8	165 14 02.2	Camp Hill.....	3627.4	3.559596
	124 13 13.111	294.1	12 33 33.1	192 33 15.4	Ten Mile.....	2649.9	3.423235
Indian 2, 1885.....	43 36 12.150	375.0	14 01 36.1	194 01 02.5	Camp Hill.....	4508.8	3.654064
	124 11 43.201	968.9	36 54 45.9	216 53 26.2	Ten Mile.....	4318.6	3.635348
			66 44 46.5	246 43 44.5	Sea Lion.....	2195.1	3.341453
Hammock, 1885.....	43 36 42.869	1323.0	336 20 58.6	156 21 11.4	Indian 2.....	1035.0	3.014924
	124 12 01.712	38.4	26 19 59.9	206 18 53.0	Ten Mile.....	4910.8	3.691150
			41 25 41.4	221 24 52.2	Sea Lion.....	2420.4	3.383890
Bear, 1885.....	43 37 44.267	1366.2	332 55 47.6	152 56 17.4	Hammock.....	2127.9	3.327955
	124 12 44.895	1006.5	9 40 53.6	189 40 34.2	Sea Lion.....	3763.4	3.575584
Faun 2, 1885.....	43 37 26.250	810.1	1 34 57.8	181 34 55.9	Indian 2.....	2287.8	3.359409
	124 11 40.383	905.4	19 39 34.7	199 39 20.0	Hammock.....	1421.7	3.152803
			33 24 28.6	213 23 24.7	Sea Lion.....	3777.7	3.577224
			111 02 08.5	291 01 24.0	Bear.....	1549.5	3.190200

Coos Bay.

<i>Principal points.</i>							
Mill, 1906.....	43 23 16.604	512.4	267 26 53.7	87 30 37.1	Noah.....	228.5	3.865017
	124 13 14.903	335.4	341 38 09.4	161 38 25.3	Marshfield Hill.....	1658.7	3.219777
White Point 3, 1906.....	43 22 12.536	386.9	137 31 16.0	317 30 20.8	Mill.....	2681.1	3.428321
	124 11 54.459	1226.1	247 19 49.9	67 22 38.1	Noah.....	5972.1	3.776128
			107 22 08.6	287 21 29.3	Marshfield Hill.....	1350.0	3.130340
Pierce, 1863.....	43 24 01.553	47.9	2 51 45.4	182 51 40.3	White Point 3.....	3368.5	3.527443
	124 11 46.986	1057.3	54 58 28.5	234 57 28.1	Mill.....	2416.4	3.383175
			26 11 34.2	206 10 49.8	Marshfield Hill.....	3300.2	3.518538
Porter, 1889.....	43 23 55.949	1726.6	264 30 59.1	84 31 54.2	Pierce.....	1812.5	3.258279
	124 13 07.162	161.2	352 52 47.3	172 52 57.9	Marshfield Hill.....	2810.2	3.448731
			332 50 42.1	152 51 32.0	White Point 3.....	3586.5	3.554672
Stump, 1889.....	43 24 12.984	400.7	279 39 59.7	99 41 02.9	Pierce.....	2099.0	3.322021
	124 13 18.939	426.2	349 30 47.0	169 31 05.7	Marshfield Hill.....	3370.5	3.527694
Dewey, 1862.....	43 24 18.720	577.7	285 04 08.8	105 05 08.9	Pierce.....	2036.6	3.308915
	124 13 14.379	323.5	346 59 13.8	166 59 18.8	Porter.....	721.3	2.858095
Mabry, 1862.....	43 25 39.133	1207.7	348 54 13.7	168 54 31.7	Pierce.....	3068.8	3.486654
	124 12 13.232	297.7	20 51 48.5	200 51 11.5	Porter.....	3407.7	3.532464
			29 00 24.0	208 59 42.0	Dewey.....	2837.4	3.452924
			29 04 52.4	209 04 07.2	Stump.....	3042.0	3.483157
North Bend 2, 1889.....	43 25 14.526	448.3	236 05 35.6	56 06 10.1	Mabry.....	1361.5	3.134034
	124 13 03.466	78.0	322 36 34.5	142 37 27.1	Pierce.....	2834.2	3.452401
Russell, 1862.....	43 26 02.037	62.9	298 35 06.5	118 35 46.1	Mabry.....	1477.1	3.169405
	124 13 10.895	245.0	333 04 33.3	153 05 31.0	Pierce.....	4170.0	3.620138
			353 29 51.6	173 29 56.7	North Bend 2.....	1475.7	3.169008
North Slough '89, 1889.....	43 25 55.706	1719.2	262 48 29.8	82 49 17.2	Russell.....	1562.2	3.193736
	124 14 19.808	445.5	280 10 20.7	100 11 47.8	Mabry.....	2892.6	3.461286
			336 37 53.8	156 38 35.7	Stump.....	3453.2	3.538225
Simpson, 1862.....	43 25 14.300	441.3	136 54 31.0	316 53 54.4	North Slough '89.....	1750.0	3.243043
	124 13 26.653	599.6	193 31 35.5	13 31 46.3	Russell.....	1515.3	3.180643
			245 06 01.2	65 06 51.6	Mabry.....	1820.7	3.260248
Pony, 1862.....	43 25 06.148	189.7	203 15 36.0	23 15 56.1	North Slough '89.....	1664.8	3.221353
	124 14 49.038	1103.2	231 59 23.0	52 00 30.4	Russell.....	2801.5	3.447392
		262 15 42.5	82 16 39.1	Simpson.....	1870.3	3.271919	
North Slough, 1862.....	43 25 58.422	1803.0	317 30 19.1	137 30 57.2	Simpson.....	1846.5	3.266359
	124 14 22.103	497.1	20 35 13.5	200 34 55.0	Pony.....	1723.2	3.236347
Ridge, 1863.....	43 25 36.276	1119.5	247 06 14.0	67 07 03.5	North Slough.....	1757.1	3.244806
	124 15 34.073	766.4	250 14 44.4	70 15 35.5	North Slough '89.....	1774.8	3.249143
			283 18 00.3	103 19 27.9	Simpson.....	2945.4	3.469144
			312 32 28.0	132 32 59.0	Pony.....	1375.1	3.138322
Hutchinson, 1862.....	43 25 08.423	259.9	233 35 58.9	53 36 34.5	Ridge.....	1448.7	3.160966
	124 16 25.911	582.9	240 59 56.7	61 01 21.7	North Slough.....	3183.8	3.502947
			242 45 54.5	62 47 21.2	North Slough '89.....	3189.9	3.503774
			271 50 09.8	91 51 16.4	Pony.....	2180.4	3.338542

Coos Bay—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
	° ' "		° ' "	° ' "		<i>Meters.</i>	
Tophet, 1862.....	43 24 39.709 124 15 32.772	1225.5 737.3	126 33 06.4 179 02 22.6 213 11 43.5	306 32 29.9 359 02 21.7 33 12 32.0	Hutchinson..... Ridge..... North Slough.....	1488.1 1746.0 2903.1	3.172636 3.242032 3.462861
Henderson, 1861.....	43 24 44.112 124 16 46.210	1361.4 1039.7	211 19 33.8 225 13 22.0 274 41 38.0	31 19 47.8 45 14 11.6 94 42 28.5	Hutchinson..... Ridge..... Tophet.....	878.3 2285.8 1657.9	2.943652 3.359045 3.219546
Cemetery, 1861.....	43 24 06.694 124 16 06.075	206.6 136.7	141 58 36.1 166 48 58.6 194 35 37.8 215 23 16.6	321 58 08.5 346 48 45.0 14 35 59.8 35 24 29.6	Henderson..... Hutchinson..... Ridge..... North Slough '89.....	1466.0 1956.6 2856.8 4127.2	3.166120 3.291506 3.455882 3.615652
Coos Bay north base, 1861.....	43 24 17.188 124 16 56.739	530.4 1276.7	195 54 45.5 249 47 38.4 285 51 09.7	15 54 52.7 69 43 36.1 105 51 44.5	Henderson..... Tophet..... Cemetery.....	864.0 2013.1 1185.2	2.936528 3.303861 3.073778
Coos Bay south base, 1861.....	43 23 58.846 124 17 17.930	1816.1 403.4	207 03 38.1 220 06 35.7 261 28 28.2	27 03 59.9 40 06 50.3 81 29 17.6	Henderson..... Coos Bay north base..... Cemetery.....	1568.7 740.1 1635.0	3.195548 2.869305 3.213520
Telegraph, 1862.....	43 23 56.677 124 16 20.683	1749.1 465.5	92 58 47.0 127 57 46.8 158 34 45.2	272 58 07.6 307 57 22.0 338 34 27.6	Coos Bay south base..... Coos Bay north base..... Henderson.....	1290.0 1029.0 1572.5	3.110587 3.012434 3.196601
Ridge 2, 1889.....	43 25 36.617 124 15 44.012	1130.0 989.9	252 42 50.4 282 33 10.8 307 14 36.0 10 08 32.6	72 43 48.3 102 34 45.2 127 15 13.8 190 08 17.5	North Slough '89..... Simpson..... Pony..... Cemetery.....	1983.5 3165.7 1558.5 2819.2	3.297425 3.500465 3.191325 3.450123
Hutchinson 2, 1889.....	43 25 08.537 124 16 25.841	263.5 581.3	227 21 02.9 242 48 30.0 271 55 46.6 346 52 49.9	47 21 31.6 62 49 56.6 91 56 53.1 166 53 03.5	Ridge 2..... North Slough '89..... Pony..... Cemetery.....	1279.2 3186.9 2179.0 1959.7	3.106938 3.503366 3.338252 3.292185
Pest, 1889.....	43 24 10.408 124 17 33.085	321.2 744.5	220 08 12.1 233 12 30.4 273 20 31.2	40 08 58.3 53 14 43.2 93 21 31.0	Hutchinson 2..... North Slough '89..... Cemetery.....	2346.7 5428.3 1961.3	3.370463 3.734663 3.292546
Empire 2, 1889.....	43 23 44.577 124 16 32.263	1375.7 726.1	120 13 21.7 183 11 27.7 197 25 32.9	300 12 39.9 3 11 32.1 17 26 06.0	Pest..... Hutchinson 2..... Ridge 2.....	1583.9 2595.1 3624.1	3.199738 3.414156 3.559200
Midway, 1889.....	43 22 44.169 124 17 15.799	1363.1 355.7	171 41 05.9 207 43 28.5	351 40 54.0 27 43 56.4	Pest..... Empire 2.....	2689.7 2106.1	3.429702 3.323479
Grove, 1889.....	43 23 07.918 124 18 21.852	244.4 491.9	209 38 25.2 245 20 58.9 296 14 00.4	29 38 58.7 65 22 14.2 116 14 45.8	Pest..... Empire 2..... Midway.....	2218.9 2713.6 1657.7	3.346145 3.433547 3.219501
Pigeon 2, 1889.....	43 21 41.655 124 18 14.651	1285.5 329.9	176 30 56.5 191 30 58.4 214 28 34.8 211 16 22.7	356 30 51.5 11 31 26.9 34 29 15.2 31 17 33.0	Grove..... Pest..... Midway..... Empire 2.....	2667.1 4685.0 2340.4 4438.8	3.426033 3.670710 3.369294 3.647266
North Spit, 1889.....	43 21 55.334 124 19 09.394	1707.6 211.5	205 32 03.6 239 28 43.6 288 53 58.5	25 32 36.2 59 30 01.6 108 54 36.1	Grove..... Midway..... Pigeon 2.....	2482.5 2968.5 1302.9	3.394897 3.472533 3.114920
Fossil 2, 1889.....	43 21 29.456 124 18 38.200	909.0 860.2	138 40 14.6 186 54 17.8 218 48 50.5	318 39 53.2 6 54 29.0 38 49 47.1	North Spit..... Grove..... Midway.....	1063.6 3060.8 2959.4	3.026761 3.485837 3.471209
Surf, 1889.....	43 22 27.793 124 19 18.592	857.7 418.6	259 37 40.7 314 40 40.0 333 11 42.2 348 19 06.2	79 39 05.0 134 41 23.9 153 12 09.9 168 19 12.5	Midway..... Pigeon 2..... Fossil 2..... North Spit.....	2810.1 2024.8 2017.0 1022.9	3.448728 3.306389 3.304705 3.009829
Coos Head 2, 1889.....	43 21 05.138 124 20 10.360	158.6 233.3	204 33 16.7 221 32 35.6 246 36 02.8 250 06 40.5	24 33 52.4 41 33 17.5 66 37 22.3 70 07 43.8	Surf..... North Spit..... Pigeon 2..... Fossil 2.....	2804.5 2069.9 2839.0 2207.0	3.447861 3.315953 3.453163 3.343798
Empire 3, 1909.....	43 23 44.585 124 16 32.273	1376.0 726.5	31 17 17.8 65 21 49.4	211 16 07.5 245 20 34.1	Pigeon 2..... Grove.....	4438.9 2713.5	3.642725 3.433531
Jetty, 1909.....	43 21 48.857 124 19 12.058	1507.8 271.5	204 51 05.0 225 11 18.0 279 45 04.2	24 51 39.4 45 13 07.8 99 45 43.6	Grove..... Empire 3..... Pigeon 2.....	2688.9 5068.8 1311.6	3.429582 3.704909 3.117809
Ocean, 1909.....	43 22 17.223 124 19 26.995	531.5 607.8	303 58 05.0 338 58 56.6	123 58 54.7 158 59 06.9	Pigeon 2..... Jetty.....	1964.2 937.8	3.293190 2.972098
Coos Head 3, 1909.....	43 21 05.116 124 20 10.345	157.9 233.0	203 40 52.3 241 06 06.6 246 35 09.6	23 41 22.0 44 12 10.3 66 36 29.0	Ocean..... Jetty..... Pigeon 2.....	2430.0 1882.8 2838.9	3.385600 3.274812 3.453156
Cape Arago Lighthouse, 1909.....	43 20 30.006 124 22 27.957	926.0 629.7	230 54 29.6 241 06 06.6 248 47 23.8 250 43 05.3	50 56 33.8 61 08 21.1 63 50 17.7 70 44 39.8	Ocean..... Jetty..... Pigeon 2..... Coos Head 3.....	5249.3 5038.4 6118.3 3283.4	3.720102 3.702294 3.786632 3.516321

Coos Bay—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
Crawford 2, 1889.....	43 23 22.559	696.2	52 17 50.5	232 16 41.1	Marshfield Hill.....	Meters. 2874.1	3.458502
	124 11 10.683	240.5	111 28 11.1	201 26 51.1	Porter.....	2816.7	3.449734
Timmermann, 1889.....	43 21 56.221	1735.1	117 36 26.3	297 35 33.4	Marshfield Hill.....	1956.4	3.291455
	124 11 34.684	781.2	150 36 44.1	330 35 40.6	Porter.....	4240.9	3.627462
			175 54 21.7	355 54 13.2	Pierce.....	3877.8	3.588580
White Point 2, 1889.....	43 22 12.545	387.2	107 21 30.3	287 20 51.0	Marshfield Hill.....	1349.8	3.130279
	124 11 54.463	1226.3	152 51 29.7	332 50 39.8	Porter.....	3586.2	3.554635
Isthmus 2, 1889.....			182 51 47.6	2 51 52.7	Pierce.....	3368.3	3.527406
			204 30 51.8	24 31 21.9	Crawford 2.....	2374.8	3.375630
Marsh, 1889.....	43 21 22.544	695.7	141 09 07.3	321 08 42.2	Marshfield Hill.....	1310.1	3.117295
	124 12 48.906	1101.5	162 55 47.1	342 55 11.4	Porter.....	3984.4	3.600361
			207 35 18.7	27 36 03.0	Crawford 2.....	3124.9	3.496229
Coos, 1863.....	43 22 28.513	880.0	217 04 12.1	37 04 26.3	White Point 2.....	774.1	2.888808
	124 10 16.280	366.6	178 09 16.7	358 09 14.8	Marshfield Hill.....	1946.7	3.289297
Grass, 1889.....	43 21 59.753	1843.9	218 27 34.6	38 28 12.0	White Point 2.....	1970.8	3.294633
	124 10 36.206	815.2	104 39 44.6	39 22 07.8	Isthmus 2.....	1197.0	3.078101
Coos River Hill, 1889.....	43 21 59.255	1828.7	88 32 18.0	268 30 31.3	Timmermann.....	2027.1	3.306877
	124 09 27.596	621.4	143 43 04.6	323 42 27.3	Marshfield Hill.....	3499.9	3.544656
Loggie, 1889.....	43 20 54.853	1692.8	100 34 35.6	270 33 48.5	Crawford 2.....	2069.2	3.315803
	124 09 40.549	913.4	90 32 59.0	280 00 38.9	Marshfield Hill.....	4606.4	3.668980
Ross, 1889.....	43 21 03.350	103.4	129 29 06.9	309 28 33.5	Coos.....	1420.1	3.152316
	124 10 23.244	523.5	137 56 15.3	317 55 04.6	Crawford 2.....	3463.3	3.539491
Violet, 1862.....	43 25 02.089	64.5	147 58 04.5	327 57 26.3	Grass.....	2362.7	3.373409
	124 14 36.799	827.9	164 26 54.6	344 26 30.1	Coos.....	3000.3	3.477166
Branch, 1863.....	43 24 42.183	1301.8	188 20 53.1	8 21 02.0	Coos River Hill.....	2008.8	3.302935
	124 14 18.893	425.2	170 28 54.7	350 28 45.8	Grass.....	1765.0	3.246733
Haynes, 1862.....	43 27 06.833	210.9	183 24 50.5	3 24 55.3	Coos.....	2632.9	3.420430
	124 13 05.513	124.0	215 59 12.0	35 59 50.2	Coos River Hill.....	2132.4	3.328859
Charleston 2, 1889.....	43 20 49.314	1521.9	285 14 57.5	205 15 26.8	Loggie.....	996.7	2.998559
	124 19 40.337	908.1	190 45 55.3	10 46 05.4	North Slough.....	1769.6	3.247885
Bluff (U. S. E.), 1907.....	43 20 49.866	1538.9	226 14 15.0	46 15 14.0	Russell.....	2675.2	3.427357
	124 18 55.412	1248.0	256 33 44.3	76 34 32.5	Simpson.....	1622.4	3.210160
Curve (U. S. E.), 1907.....	43 21 27.534	849.7	146 44 48.1	326 44 35.8	Violet.....	734.6	2.866067
	124 19 33.157	746.7	178 14 34.4	358 14 32.2	North Slough.....	2353.9	3.371791
Grass Mound (U. S. E.), 1907.....	43 22 17.377	536.3	211 49 15.3	31 50 02.0	Russell.....	2900.5	3.462477
	124 19 06.936	156.2	229 51 08.8	49 51 44.7	Simpson.....	1537.4	3.186795
Nelson (U. S. E.), 1907.....	43 27 06.833	210.9	7 47 51.3	187 47 36.8	Simpson.....	3505.3	3.544724
	124 13 05.513	124.0	37 17 00.1	217 16 09.0	North Slough '89.....	2758.6	3.440681
Midway Point (U. S. E.), 1907.....	43 20 49.314	1521.9	189 09 01.5	9 09 16.4	Surf.....	3078.3	3.488317
	124 19 40.337	908.1	198 52 41.5	18 53 02.7	North Spit.....	2153.3	3.333106
Marsh (U. S. E.), 1907.....	43 20 49.866	1538.9	228 28 35.5	48 29 18.1	Fossil 2.....	1868.9	3.271595
	124 18 55.412	1248.0	89 02 24.5	209 01 53.7	Charleston 2.....	1012.0	3.005169
Empire Dock (U. S. E.), 1907.....	43 21 27.534	849.7	143 49 39.5	323 49 13.6	Curve (U. S. E.).....	1440.1	3.158395
	124 19 33.157	746.7	7 48 23.6	187 48 18.7	Charleston 2.....	1190.5	3.075739
Sand Beach (U. S. E.), 1907.....	43 22 17.377	536.3	200 59 45.9	21 00 03.9	Grass Mound (U. S. E.).....	1647.6	3.216856
	124 19 06.936	156.2	267 14 59.4	87 15 37.1	Fossil 2.....	1239.0	3.093009
Nelson (U. S. E.), 1907.....	43 22 50.124	1546.9	32 39 06.5	212 38 18.9	Coos Head 2.....	2647.6	3.422849
	124 18 31.623	711.8	218 11 11.3	38 11 35.5	Nelson (U. S. E.).....	1285.8	3.109182
Midway Point (U. S. E.), 1907.....	43 22 37.353	1152.8	313 06 51.4	133 07 27.3	Pigeon 2.....	1612.8	3.207582
	124 17 21.785	490.4	336 22 02.4	156 22 22.7	Fossil 2.....	1614.2	3.207960
Marsh (U. S. E.), 1907.....	43 23 41.331	1275.5	217 49 08.8	37 49 46.3	Marsh (U. S. E.).....	2000.7	3.301176
	124 17 37.114	835.2	284 03 58.9	104 04 46.9	Midway Point (U. S. E.).....	1620.8	3.209724
Empire Dock (U. S. E.), 1907.....	43 23 45.588	1406.9	349 44 53.4	169 45 05.1	Pigeon 2.....	2147.3	3.331887
	124 16 42.651	959.8	34 42 22.1	214 41 45.8	Pigeon 2.....	2090.8	3.320307
Sand Beach (U. S. E.), 1907.....	43 23 41.331	1275.5	170 05 22.2	350 05 11.7	Marsh (U. S. E.).....	2004.3	3.301973
	124 17 37.114	835.2	202 41 43.5	22 42 10.4	Empire Dock (U. S. E.).....	2282.6	3.358435
Lookout Point (U. S. E.), 1907.....	43 23 45.588	1406.9	224 19 04.5	44 19 24.8	Sand Beach (U. S. E.).....	952.4	2.978800
	124 16 42.651	959.8	263 52 33.7	83 53 11.1	Empire Dock (U. S. E.).....	1232.7	3.090860
Jarvis (U. S. E.), 1907.....	43 23 45.588	1406.9	134 28 18.7	314 28 01.6	Sand Beach (U. S. E.).....	785.1	2.894905
	124 17 07.546	189.8	229 20 56.9	49 21 16.3	Lookout Point (U. S. E.).....	838.3	2.923424
Lookout Point (U. S. E.), 1907.....	43 24 03.409	105.2	208 17 05.4	28 17 22.0	Jarvis (U. S. E.).....	1150.9	3.061027
	124 17 07.546	189.8	270 10 45.7	90 11 22.2	Lookout Point (U. S. E.).....	1190.3	3.077830

¹ No check on this position.

Coos Bay—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Supplementary points—Continued.</i>							
Mabry (U. S. E.), 1907.....	43 25 39.132 124 12 13.228	1207.7 297.5	100 11 49 118 35 43 348 54 20	280 10 21 298 35 04 168 54 38	North Slough '89 Russell..... Pierce.....	Meters. 2892.7 1477.2 3068.7	3.461302 3.169437 3.486957
Lookout Point (U. S. E.), 1907.....	43 24 03.284 124 16 14.386	101.3 323.7	147 23 40.5 218 52 54.2	327 23 20.6 38 53 36.0	Jarvis (U. S. E.) Pony Point (U. S. E.)	1207.6 2183.2	3.081939 3.339086
Jarvis (U. S. E.), 1907.....	43 24 36.248 124 16 43.308	1118.6 974.4	204 19 29.6 251 20 40.8	24 19 47.2 71 21 42.5	Henderson (U. S. E.) Pony Point (U. S. E.)	1401.5 2133.2	3.146608 3.329022
Pony Point (U. S. E.), 1907.....	43 24 58.348 124 15 13.472	1800.7 303.1	149 48 56.9 228 37 58.0	329 48 35.9 48 38 22.5	Ridge..... Island (U. S. E.)	1366.3 1066.9	3.135547 3.028111
Henderson (U. S. E.), 1907.....	43 25 17.630 124 16 17.644	544.1 396.9	232 14 18.5 292 23 41.7	52 14 41.6 112 24 25.8	Ridge..... Pony Point (U. S. E.)	956.9 1561.5	2.980877 3.193537
Island (U. S. E.), 1907.....	43 25 21.194 124 14 37.878	654.1 852.1	107 44 57.0 200 53 12.0 270 41 00.5	287 44 11.5 20 53 24.4 90 42 01.5	Ridge..... North Slough '89 Hay Barn (U. S. E.)	1561.9 1140.0 1970.0	3.193658 3.056896 3.294476
Hay Barn (U. S. E.), 1907.....	43 25 20.423 124 13 10.310	630.3 231.9	124 51 56.1 179 24 41.4 245 46 56.3	304 51 07.5 339 24 41.0 65 47 35.6	North Slough '89 Russell..... Mabry (U. S. E.)	1905.1 1284.3 1407.8	3.279923 3.108652 3.148555
North Bend (U. S. E.), 1907.....	43 24 12.718 124 13 19.287	392.4 434.0	156 48 58.8 209 07 26.7 279 24 38.5 298 02 40.5 349 21 23.0	336 48 17.2 29 08 12.1 99 25 41.9 118 04 08.9 169 21 42.0	North Slough '89 Mabry (U. S. E.) Pierce..... Crawford Point (U. S. E.) Marshfield Hill	3457.7 3053.0 2105.4 3279.2 3363.9	3.538784 3.484725 3.323337 3.515768 3.526840
Stave Mill (U. S. E.), 1907.....	43 23 11.840 124 13 15.306	365.4 344.5	232 19 47.5 339 34 07.6	52 20 48.2 159 34 23.8	Pierce..... Marshfield Hill	2510.9 1523.1	3.399831 3.182724
Crawford Point (U. S. E.), 1907.....	43 23 22.740 124 11 10.698	701.8 240.8	24 27 16.0 52 12 18.8	204 26 43.3 232 11 09.4	White Point 3 Marshfield Hill	2380.0 2877.3	3.376582 3.458981
Marshfield U. S. G. S. bench mark, 1906.	43 22 08.434 124 12 41.501	260.3 934.4	156 34 31.0 249 42 24.0 263 10 49.4	336 34 24.0 69 45 44.5 83 11 21.7	Marshfield Hill. Noah..... White Point 3	577.0 7004.3 1066.7	2.761199 3.845362 3.028033
Marshfield front range, 1906.....	43 22 34.121 124 12 31.092	1053.0 700.0	143 03 13.2 162 10 52.1 308 55 22.7	323 02 43.1 342 10 27.3 128 55 47.8	Mill..... Porter..... White Point 3	1640.6 2652.6 1060.1	3.214993 3.423666 3.025365
Marshfield rear range, 1906.....	43 22 40.196 124 12 29.682	1240.5 668.2	137 49 45.0 160 09 34.2 317 06 17.2	317 49 14.0 340 09 08.5 137 66 41.4	Mill..... Porter..... White Point 3	1516.1 2485.5 1165.1	3.180728 3.395422 3.066376
Barker, 1889.....	43 20 49.868 124 18 55.417	1539.0 1248.2	89 02 08.1 170 12 17.2 171 08 46.0	269 01 37.3 350 12 01.3 351 08 36.4	Charleston 2 Surf..... North Spit	1011.9 3066.8 2044.7	3.005128 3.486681 3.310631
Quicksand, 1889.....	43 23 09.428 124 18 54.117	291.0 1218.2	273 40 10.9 341 50 09.7 23 12 41.1	93 40 33.0 161 50 36.8 203 12 24.3	Grove..... Pigeon 2 Surf.....	727.7 2850.7 1398.0	2.861974 3.454958 3.145518
Fall, 1889.....	43 24 02.456 124 18 20.795	75.8 468.0	257 07 10.1 0 48 37.9 24 37 27.1	77 07 42.9 180 48 37.2 204 37 04.3	Pest..... Grove..... Quicksand	1103.8 1679.4 1800.1	3.041902 3.226149 3.255304
Stave Mill stack, 1889.....	43 23 10.589 124 13 11.479	326.8 258.4	262 15 05.8 293 34 24.6 315 55 39.4 342 12 43.4	82 16 28.8 113 36 58.3 135 56 32.3 162 12 57.0	Crawford 2..... Coos River Hill White Point 2 Marshfield Hill	2743.9 5499.9 2492.9 1458.4	3.438361 3.740835 3.396707 3.163876
Odd Fellows Monument, 1889.....	43 21 38.657 124 13 08.006	1193.0 180.3	194 13 49.5 219 28 03.5 237 43 03.5 250 11 42.1	14 14 00.7 39 29 24.1 57 43 54.0 70 12 18.4	Marshfield Hill Crawford 2..... White Point 2 Isthmus 2	1494.3 4154.2 1958.5 1264.0	3.174433 3.618492 3.291927 3.101755
Merchants tank, 1889.....	43 21 54.744 124 12 57.611	1680.6 1297.2	221 36 09.1 248 52 07.2 274 05 08.2	41 37 22.5 68 52 50.5 94 05 37.3	Crawford 2..... White Point 2 Isthmus 2	3624.7 1524.3 957.7	3.559275 3.183058 2.981207
Lutheran church spire, 1889.....	43 22 08.213 124 12 51.728	253.5 1164.6	180 05 30.6 224 44 33.9 264 04 26.7 300 27 44.9	0 05 30.6 44 45 43.3 84 05 06.0 120 28 10.0	Marshfield Hill Crawford 2..... White Point 2 Isthmus 2	536.3 3230.8 1296.2 954.5	2.729407 3.509311 3.112678 2.979772
Schoolhouse cupola, 1889.....	43 22 12.252 124 12 52.327	378.1 1178.0	226 30 40.4 269 35 45.4 306 02 39.6	46 31 50.2 89 36 25.1 126 03 05.1	Crawford 2..... White Point 2 Isthmus 2	3153.3 1302.8 1034.2	3.498761 3.114881 3.014609
Slaughterhouse east gable, 1889.....	43 23 42.107 124 13 08.070	1299.4 181.6	251 47 13.6 282 51 03.9 329 03 05.8	71 48 09.3 102 52 24.6 149 03 56.4	Pierce..... Crawford 2..... White Point 2	1916.5 2709.9 3222.5	3.283501 3.432959 3.508194
Marshfield cannery, 1889.....	43 23 03.532 124 10 33.938	109.0 763.9	339 48 15.5 33 21 52.8 69 19 38.5	159 48 27.6 213 21 11.1 249 18 03.9	Coos..... Timmermann Marshfield Hill	1151.5 2487.0 3314.7	3.061256 3.395679 3.520439

Coos Bay—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
Spring, 1889.....	43 24 55.319	1707.2	225 15 18.6	45 16 39.3	Coos Bay Tree.....	<i>Meters.</i> 3718.8	3.570408
	124 17 48.761	1097.0	257 39 26.3	77 40 23.3	Hutchinson 2.....	1909.5	3.280929
Summer, 1889.....	43 25 59.623	1840.0	345 43 12.7	165 43 23.5	Pest.....	1426.9	3.155391
	124 17 13.580	305.4	383 50 19.4	203 49 57.4	Fall.....	1783.5	3.251281
Winter, 1889.....	43 26 50.392	1555.1	21 41 41.4	71 07 27.0	Coos Bay Tree.....	1955.4	3.291244
	124 16 46.252	1040.7	210 43 52.6	201 44 17.3	Spring.....	2136.5	3.329697
Lookout, 1889.....	43 23 56.697	1749.8	307 03 59.3	30 45 04.0	Unknown.....	1820.6	3.260220
	124 16 19.931	449.0	21 23 54.3	127 04 37.1	Coos Bay Tree.....	1549.3	3.190122
Lookout, 1889.....			209 18 46.2	201 23 35.5	Summer.....	1682.8	3.226022
			104 25 33.8	356 34 43.2	Midway.....	2567.1	3.409439
			176 34 47.2	36 21 44.3	Pest.....	1699.2	3.230257
			216 20 21.7		Hutchinson 2.....	2221.0	3.346552
					North Slough '89.....	4560.2	3.658980

Port Orford.

<i>Principal points.</i>							
Arch Rock, 1869.....	42 46 44.012	1358.1	209 57 23.0	29 59 28.6	Sixes.....	8401.7	3.924368
	124 35 45.777	1040.6	299 24 03.8	119 27 41.9	Heads.....	8502.1	3.926528
Blanco, 1869.....	42 50 07.676	236.8	299 37 26.2	119 40 49.2	Port Orford south base.....	7826.5	3.893560
	124 33 44.920	1020.2	23 36 51.6	156 02 08.6	Heads.....	11451.1	4.058848
Bluff, 1869.....	42 49 55.756	1720.5	111 21 14.2	201 20 50.0	Arch Rock.....	6971.8	3.843345
	124 33 03.492	79.3	200 32 39.9	202 32 55.2	Blanco.....	1010.3	3.004120
Port Orford north base, 1869.....	42 48 19.897	614.0	342 21 39.2	162 23 12.0	Sixes.....	1453.7	3.162469
	124 31 38.858	882.9	62 13 22.2	242 10 34.5	Port Orford south base.....	10271.0	4.011613
West, 1869.....	42 50 23.599	728.2	139 16 53.8	319 15 28.1	Arch Rock.....	6344.0	3.802362
	124 33 49.648	1127.5	146 59 05.4	326 58 07.9	Blanco.....	4388.8	3.642350
Wilson, 1869.....	42 51 20.788	641.5	350 08 20.2	170 08 55.6	Bluff.....	3527.9	3.547521
	124 32 16.007	363.5	24 13 33.1	204 13 16.1	Port Orford south base.....	6933.1	3.840929
Rocky Point, 1869.....	42 52 31.024	957.3	8 40 08.5	188 39 58.6	Sixes.....	1637.2	3.214100
	124 32 01.452	33.0	14 40 53.7	129 20 33.5	Bluff.....	1355.4	3.132053
Best Rock, 1869.....	42 47 28.325	874.0	32 00 12.4	211 58 58.8	Blanco.....	502.9	2.701514
	124 35 40.277	915.4	253 48 04.3	73 50 48.3	Sixes.....	1384.6	3.141323
Port Orford astronomic, 1869.....	42 44 28.919	892.4	242 25 11.8	62 28 00.8	West.....	2763.2	3.441466
	124 30 05.243	119.4	154 29 22.3	334 26 53.1	Wilson.....	2192.4	3.340917
Round, 1869.....	42 46 52.420	1617.5	168 25 02.7	348 24 46.2	Sixes.....	3545.7	3.549707
	124 31 14.510	329.8	99 25 26.2	279 22 12.8	West.....	4636.3	3.666170
Pine Hill, 1869.....	42 46 09.287	286.6	167 56 41.2	347 56 15.5	Port Orford north base.....	5712.4	3.756816
	124 31 00.977	22.2	242 25 11.8	62 28 00.8	Port Orford south base.....	8486.4	3.928721
Arch Rock Summit, 1869.....	42 46 44.274	1366.2	301 39 25.5	121 49 03.6	Arch Rock.....	1373.1	3.137701
	124 35 47.661	1083.4	202 09 01.6	22 10 21.1	Heads.....	338.7	2.529817
Cape Blanco Lighthouse, 1907.....	42 50 14.934	460.8	242 25 11.8	62 28 00.8	Blanco.....	11584.4	4.063874
	124 33 45.969	1043.9	299 31 14.6	119 34 39.0	Arch Rock.....	6171.8	3.790409
Port Orford south base, 1869.....	42 44 38.531	1189.0	301 39 25.5	121 49 03.6	Port Orford north base.....	2755.5	3.440193
	124 30 46.654	1061.1	267 02 34.4	87 06 26.5	Port Orford north base.....	4121.3	3.615029
Castle Rock, 1907.....	42 51 25.607	790.1	323 29 56.5	143 37 31.8	Cape.....	6971.0	3.843292
	124 32 47.428	1076.7	354 07 08.2	174 07 12.6	Port Orford north base.....	6378.1	3.804693
			33 21 25.9	213 20 42.0	Port Orford south base.....	7867.7	3.895848
					Bald.....	22763.7	4.357242
					Madden.....	7765.4	3.890164
					Heads.....	11665.7	4.066909
					Cape.....	142.4	2.153636
					Cape.....	11160.9	4.047700
					Madden.....	11389.7	4.056512
					Bald.....	25674.9	4.409509
					Sixes.....	1418.8	3.151923
					Cape.....	2064.0	3.425535

San Sebastian to Chetko River.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points.</i>							
Dolan, 1873.....	42 18 06.349 124 24 08.147	195.9 186.6	196 18 45.0 256 53 23.2	16 20 16.8 76 55 30.9	Grizzly..... Sundown 2.....	<i>Meters.</i> 11099.4 4460.9	4.045300 3.649421
Red Rock, 1873.....	42 15 09.482 124 21 59.153	292.5 1356.0	151 34 12.9 180 35 42.7 192 07 54.7	331 32 46.1 0 35 47.6 12 08 35.5	Dolan..... Grizzly..... Sundown 2.....	6206.3 16110.0 6615.6	3.792833 4.207095 3.820568
Sundown, 1873.....	42 18 38.318 124 20 59.240	1182.3 1356.7	12 01 56.6 77 10 30.2 217 03 43.2	192 01 16.3 257 08 23.0 37 03 43.7	Red Rock..... Dolan..... Sundown 2.....	6588.2 4437.8 30.203	3.818768 3.647164 1.480050
Cape Sebastian pole, 1907.....	42 19 41.410 124 25 42.243	1277.7 967.3	172 34 21.7 286 27 13.6 323 41 13.6	352 31 23.9 106 30 24.7 143 42 17.0	Port Orford astronomic..... Sundown 2..... Dolan.....	46289.8 6777.2 3639.6	4.665485 3.831049 3.561051
Crooks Point, 1872.....	42 15 08.310 124 24 36.602	256.4 839.0	186 45 59.2 217 31 33.8 269 24 41.6	6 46 18.4 37 34 00.1 89 26 27.5	Dolan..... Sundown..... Red Rock.....	5531.9 8172.6 3609.5	3.742876 3.912362 3.557445
San Sebastian, 1873.....	42 19 41.484 124 25 42.225	1280.0 966.8	286 42 46.6 323 42 50.4 349 52 50.2	106 45 57.2 143 43 53.7 169 53 34.3	Sundown..... Dolan..... Crooks Point.....	6766.9 3641.2 8561.8	3.830390 3.561243 3.932564
Cove, 1873.....	42 19 23.755 124 25 04.594	733.0 105.2	331 34 10.3 122 24 51.2	151 34 48.3 302 24 25.9	Dolan..... San Sebastian.....	2715.8 1020.6	3.433894 3.008860
Cove Island, 1873.....	42 18 54.232 124 25 28.975	1673.4 663.5	211 30 03.4 308 35 06.0	31 30 19.8 128 36 00.4	Cove..... Dolan.....	1068.4 2308.5	3.028742 3.374472
Schumacher, 1873.....	42 18 47.043 124 24 29.150	1451.6 667.8	339 02 08.4 99 12 09.2 185 07 02.4 144 22 49.1	159 02 22.4 279 11 28.9 315 06 13.1 324 22 25.2	Dolan..... Cove Island..... San Sebastian..... Cove.....	1344.6 1387.9 2371.0 1393.6	3.128585 3.142303 3.374939 3.144124
Fairview, 1873.....	42 20 01.972 124 24 51.059	60.8 1168.9	344 35 45.1 347 45 17.8 14 43 35.1	164 36 13.8 167 45 32.6 194 43 26.0	Dolan..... Schumacher..... Cove.....	3700.4 2365.8 1219.2	3.568249 3.373790 3.086082
Crooks Hill, 1872.....	42 14 41.356 124 23 02.502	1276.1 57.4	111 05 29.6 158 27 08.8 166 37 39.5 201 06 37.8 239 08 00.2	291 04 26.3 338 25 21.4 346 36 55.3 21 08 00.8 59 08 42.8	Crooks Point..... San Sebastian..... Dolan..... Sundown..... Red Rock.....	2312.0 9957.3 6501.5 7838.0 1691.8	3.363900 3.998140 3.813011 3.894207 3.228350
Bluff, 1873.....	42 17 25.293 124 24 14.567	780.4 333.7	148 09 50.6 186 37 15.2 341 54 38.0 6 48 55.1	328 09 00.5 6 37 19.5 161 55 26.5 186 48 40.3	Cove Island..... Dolan..... Crooks Hill..... Crooks Point.....	3230.4 1275.3 5321.0 4256.6	3.509259 3.106621 3.725996 3.629063
Loma, 1873.....	42 17 17.010 124 23 44.253	524.8 1013.7	348 43 41.7 16 48 54.5 110 12 11.0 160 13 32.2	168 44 09.8 196 48 19.3 290 11 50.6 340 13 16.2	Crooks Hill..... Crooks Point..... Bluff..... Dolan.....	4897.1 4148.3 740.0 1617.8	3.689938 3.617869 2.869242 3.208916
Pistol River, 1873.....	42 16 44.912 124 24 08.742	1385.8 200.3	338 16 44.0 12 05 38.0 173 53 13.2 209 31 51.8	158 17 28.6 192 05 19.3 353 53 09.3 29 32 08.3	Crooks Hill..... Crooks Point..... Bluff..... Loma.....	4103.5 3048.2 1253.1 1138.3	3.613152 3.484048 3.097974 3.056263
Crook, 1873.....	42 16 55.356 124 23 41.807	1708.1 957.9	347 42 16.3 20 49 22.9 62 25 58.8 140 54 23.6 175 12 19.7	167 42 42.8 200 48 46.1 242 25 40.7 320 54 01.6 355 12 18.1	Crooks Hill..... Crooks Point..... Pistol River..... Bluff..... Loma.....	4231.5 3533.5 996.2 1190.2 670.5	3.626497 3.548209 2.842762 3.075623 2.826411
Dune, 1873.....	42 16 01.023 124 24 14.263	31.6 326.9	17 28 37.2 185 20 13.3 203 55 19.2	197 28 22.2 5 20 17.0 23 55 41.0	Crooks Point..... Pistol River..... Crook.....	1705.1 1360.1 1834.0	3.231756 3.133562 3.263399
Sandflower, 1873.....	42 15 37.265 124 24 02.512	1149.8 57.6	321 25 25.2 41 10 41.4 169 49 38.9	141 26 05.6 221 10 18.5 339 49 31.0	Crooks Hill..... Crooks Point..... Dune.....	2206.4 1186.9 781.0	3.343686 3.074417 2.892626
Lookout, 1873.....	42 16 16.051 124 23 54.480	495.3 1248.5	337 48 39.1 8 44 45.0 44 21 29.4 159 50 50.5	157 49 14.1 188 44 39.6 224 21 16.1 339 50 40.9	Crooks Hill..... Sandflower..... Dune..... Pistol River.....	3155.4 1210.8 648.5 948.6	3.499049 3.083074 2.811913 2.977070
Macks Arch, highest point, 1873.....	42 13 43.819 124 24 31.005	1352.1 711.0	183 41 53.8 208 06 44.3 228 48 42.1	3 42 09.2 28 09 07.4 48 49 41.6	Dolan..... Sundown 2..... Crooks Hill.....	8117.2 10331.3 2696.2	3.909407 4.014155 3.430759
Macks Point, 1872.....	42 14 31.439 124 23 57.892	970.0 1327.3	142 02 48.8 256 26 53.1	322 02 22.8 76 27 30.3	Crooks Point..... Crooks Hill.....	1442.8 1306.3	3.159219 3.116033
Ridge Knob, 1872.....	42 13 38.619 124 22 33.541	1191.6 769.2	130 07 31.1 161 04 04.3	310 06 34.4 341 03 44.8	Macks Point..... Crooks Hill.....	2529.2 2046.4	3.402990 3.311001
Snodgrass, 1872.....	42 13 44.353 124 21 14.702	1368.5 337.1	84 25 07.1 125 26 38.9	264 24 14.2 305 25 26.4	Ridge Knob..... Crooks Hill.....	1816.6 3033.6	3.259258 3.481964
Rocky Prairie, 1872.....	42 12 01.773 124 20 49.817	54.7 1142.9	141 28 57.2 169 46 45.1	321 27 47.6 349 46 28.4	Ridge Knob..... Snodgrass.....	3819.6 3216.1	3.582018 3.507329

San Sebastian to Chetko River—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
	° ' "		° ' "	° ' "		<i>Meters.</i>	
Burnt Point, 1872.....	42 11 55.868 124 22 24.370	1723.8 559.1	176 12 17.1 265 11 23.3	356 12 11.0 85 12 26.8	Ridge Knob..... Rocky Prairie.....	3177.3 2176.9	3.502059 3.337847
Smith Hill, 1871.....	42 09 12.785 124 21 13.422	394.8 308.2	162 04 24.3 185 55 43.4	342 03 36.7 5 56 04.3	Burnt Point..... Rocky Prairie.....	5288.4 5241.8	3.723325 3.719478
Bush Mound, 1872.....	42 09 14.353 124 18 36.990	442.8 849.2	89 14 52.4 149 27 56.3	269 13 07.4 329 26 27.1	Smith Hill..... Rocky Prairie.....	3591.9 3998.1	3.555321 3.598012
Red Mound, 1872.....	42 07 23.262 124 17 57.102	717.7 1311.6	126 52 24.8 165 02 27.8	306 50 13.0 345 02 01.0	Smith Hill..... Bush Mound.....	5634.5 3547.9	3.750855 3.549971
Bellevue, 1871.....	42 06 50.594 124 20 43.057	1561.0 789.2	170 58 17.0 255 10 29.3	350 57 56.6 75 12 20.6	Smith Hill..... Red Mound.....	4442.6 4343.3	3.647634 3.635861
Sister Knob, 1871.....	42 05 33.659 124 19 44.377	1038.5 1019.9	150 24 29.2 216 04 35.7	330 23 49.9 36 05 47.7	Bellevue..... Red Mound.....	2729.9 4184.6	3.436150 3.621650
Black Mound, 1872.....	42 05 52.868 124 16 52.591	1631.2 1208.4	81 28 41.0 152 01 08.6	261 26 45.8 323 00 25.4	Sister Knob..... Red Mound.....	3991.9 3158.4	3.601184 3.499462
High Mound, 1870.....	42 04 07.524 124 18 43.892	232.1 1009.1	152 23 23.2 218 11 42.6	332 22 42.7 38 12 57.3	Sister Knob..... Black Mound.....	2999.3 4136.3	3.477018 3.616608
Miller, 1870.....	42 04 03.799 124 16 26.434	117.2 607.7	92 05 43.0 169 52 22.9	272 04 10.9 349 52 05.4	High Mound..... Black Mound.....	3162.3 3418.5	3.499997 3.533830
New, 1872.....	42 09 50.166 124 20 57.171	1547.8 1312.4	288 56 13.6 17 55 50.4	108 57 47.7 197 55 39.5	Bush Mound..... Smith Hill.....	3402.6 1211.9	3.531812 3.083466
Sheep, 1871.....	42 09 23.634 124 21 39.573	729.2 908.5	229 55 55.6 299 06 53.9	49 56 24.1 119 07 11.5	New..... Smith Hill.....	1271.9 687.2	3.104446 2.837107
Head Island, 1871.....	42 08 21.570 124 21 41.222	665.5 946.7	181 07 58.0 201 59 25.7	1 07 59.1 21 59 44.4	Sheep..... Smith Hill.....	1915.3 1704.5	3.282232 3.231606
Trail, 1871.....	42 07 31.614 124 20 49.809	975.4 1144.1	353 00 43.8 142 33 00.6 170 08 54.7	173 00 48.3 322 32 26.0 350 08 38.8	Bellevue..... Head Island..... Smith Hill.....	1275.1 1941.7 3168.6	3.105548 3.288175 3.500867
Sand Hill, 1871.....	42 07 06.473 124 21 07.488	199.7 172.0	161 30 49.0 207 37 55.5 311 07 04.1	341 30 26.2 27 38 07.4 131 07 20.5	Head Island..... Trail..... Bellevue.....	2443.2 875.6 745.0	3.387951 2.942283 2.872175
Cresswell, 1871.....	42 06 08.617 124 21 01.448	265.9 33.3	175 33 20.3 198 04 06.1	355 33 16.2 18 04 18.4	Sand Hill..... Bellevue.....	1790.5 1362.3	3.252966 3.134275
Barnacle Rock, 1871.....	42 06 40.041 124 21 54.956	1235.4 1262.6	185 44 57.5 223 14 17.9 258 50 37.5 308 15 20.4	5 45 06.6 43 15 01.6 78 51 25.7 128 15 56.3	Head Island..... Trail..... Bellevue..... Cresswell.....	3148.4 2184.4 1683.6 1565.7	3.498091 3.339331 3.226239 3.194714
Elk, 1872.....	42 10 08.276 124 21 36.438	255.3 836.4	301 47 32.6 342 50 39.3	121 47 59.0 162 50 54.8	New..... Smith Hill.....	1060.5 1791.5	3.025517 3.253222
Thomas Hill, 1872.....	42 10 20.755 124 21 16.416	640.4 376.8	334 54 56.2 50 02 45.0	154 55 09.1 230 02 31.5	New..... Elk.....	1042.1 599.5	3.017897 2.777810
Deep Gulch, 1872.....	42 11 01.116 124 21 48.956	34.4 1123.4	154 18 52.8 215 56 20.6 329 02 47.2 350 00 17.4	334 18 29.0 35 57 00.3 149 03 09.1 170 00 25.8	Burnt Point..... Rocky Prairie..... Thomas Hill..... Elk.....	1874.6 2311.7 1452.1 1655.4	3.272905 3.363933 3.161987 3.218916
Green Hill, 1871.....	42 08 23.013 124 20 23.916	710.0 549.2	88 34 13.7 143 29 59.4	268 33 21.8 323 29 26.2	Head Island..... Smith Hill.....	1775.8 1910.9	3.249406 3.281231
Seal Point, ¹ 1872.....	42 11 25.28 124 21 58.54	780.0 1343.2	147 52 41.9 234 27 33.2	327 52 24.6 54 28 19.4	Burnt Point..... Rocky Prairie.....	1114.6 1937.6	3.047105 3.287272
Thomas Point, 1872.....	42 10 07.336 124 21 46.408	226.4 1065.3	165 25 15.3 200 11 17.1	345 24 49.8 20 11 55.1	Burnt Point..... Rocky Prairie.....	3460.1 3762.1	3.539094 3.575434
Red Bush, 1871.....	42 06 24.519 124 20 24.101	756.5 553.8	60 14 40.8 151 34 21.2	240 14 15.8 331 34 08.5	Cresswell..... Bellevue.....	988.5 914.8	2.994974 2.961324
Lone Knob, 1871.....	42 06 11.689 124 20 05.450	360.6 125.2	85 47 31.4 132 43 50.4 144 15 20.5	265 46 53.9 312 43 37.9 324 14 55.3	Cresswell..... Red Bush..... Bellevue.....	1290.2 583.4 1479.0	3.110658 2.765962 3.166959
Sandy Point, 1871.....	42 05 34.854 124 20 16.350	1075.4 375.7	135 09 07.1 173 22 14.5 192 25 40.1 272 52 17.5	315 08 36.9 353 22 09.3 12 25 47.4 92 52 28.2	Cresswell..... Red Bush..... Lone Knob..... Sister Knob.....	1460.4 1542.7 1163.8 735.7	3.167142 3.188270 3.065866 2.866699
Acorn, 1871.....	42 05 57.899 124 19 26.930	1786.4 618.8	57 57 16.9 115 40 36.8	237 56 43.8 295 40 11.0	Sandy Point..... Lone Knob.....	1339.9 982.1	3.127068 2.992142
Black Point, 1871.....	42 05 18.814 124 20 02.588	580.5 59.5	147 25 11.7 214 11 39.0 222 25 13.4	327 25 02.5 34 12 02.9 42 25 15.0	Sandy Point..... Acorn..... Sister Knob.....	587.3 1458.0 620.4	2.768871 3.163754 2.792888

¹ No check on this position.

San Sebastian to Chetko River—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
Bench, 1871.....	42 05 11.288 124 18 53.151	348.3 1221.4	98 17 07.5 120 23 11.6 151 38 38.1	278 16 21.0 300 22 26.6 331 38 15.5	Black Point..... Sister Knob..... Acorn.....	1612.7 1364.7 1634.3	3. 207549 3. 135096 3. 213320
Flat Knoll, 1871.....	42 04 49.316 124 19 06.575	1521.6 151.1	125 15 48.8 147 35 11.0 204 28 11.3 337 59 09.8	305 15 11.3 327 34 35.0 24 28 20.3 157 50 25.0	Black Point..... Sister Knob..... Bench..... High Mound.....	1576.6 1620.7 744.8 1300.9	3. 197733 3. 209699 2. 872600 3. 143308
Low Point, 1871.....	42 04 27.183 124 19 08.131	838.7 186.9	141 50 48.6 182 59 57.3 194 11 54.0 317 26 07.0	321 50 12.1 2 50 58.3 14 12 04.0 137 26 23.2	Black Point..... Flat Knoll..... Bench..... High Mound.....	2025.9 683.8 1403.7 823.7	3. 306628 2. 834938 3. 147272 2. 915757
Taylor, 1871.....	42 05 09.932 124 19 28.894	306.4 664.0	109 29 31.6 154 04 41.3 267 04 50.5 321 06 43.0	289 29 09.0 334 04 20.2 87 05 14.4 141 06 57.9	Black Point..... Sister Knob..... Bench..... Flat Knoll.....	821.5 814.0 822.6 817.2	2. 914588 2. 910600 2. 915169 2. 912309
Hidden, 1871.....	42 04 22.672 124 18 06.914	699.6 159.0	61 11 44.1 120 56 41.2 127 44 25.5	241 11 19.3 300 56 01.2 307 43 30.6	High Mound..... Flat Knoll..... Taylor.....	970.2 1598.9 2382.6	2. 986870 3. 203814 3. 377052
Loma, 1870.....	42 03 52.762 124 17 17.070	1628.0 392.5	102 51 31.8 124 44 20.1 128 51 08.8	282 50 33.6 304 43 06.7 308 50 35.4	High Mound..... Flat Knoll..... Hidden.....	2047.4 3062.9 1471.3	3. 311204 3. 486135 3. 167707

Chetko River to Trinidad Head.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points.</i>							
North Chetko, 1870.....	42 02 38.992 124 17 23.202	1203.1 533.6	145 49 14.8 206 30 29.5	325 48 20.7 20 31 07.5	High Mound..... Miller.....	3302.1 2924.1	3. 518787 3. 465997
Red Point, 1870.....	42 01 44.857 124 15 11.109	1384.1 255.6	118 48 38.8 158 00 13.5	298 47 10.3 337 59 23.0	North Chetko..... Miller.....	3467.2 4623.6	3. 539976 3. 664982
Fence, 1870.....	42 03 20.194 124 16 31.647	623.1 727.7	43 00 30.5 185 05 26.0	229 59 56.0 5 05 29.5	North Chetko..... Miller.....	1738.3 1350.7	3. 240125 3. 130557
Cooley, 1870.....	42 02 21.244 124 15 41.838	655.4 962.3	103 13 39.7 147 48 07.1 327 48 05.8	283 12 31.8 327 47 33.7 147 48 26.4	North Chetko..... Fence..... Red Point.....	2394.8 2149.5 1326.6	3. 379269 3. 332336 3. 122752
Pine Hill, 1870.....	42 02 41.192 124 14 33.912	1270.9 779.9	26 12 43.9 68 30 15.1 113 58 26.2 134 34 45.5	206 12 19.0 248 29 29.6 293 57 07.3 314 33 30.1	Red Point..... Cooley..... Fence..... Miller.....	1937.3 1679.1 2962.9 3631.9	3. 287193 3. 225086 3. 471716 3. 560133
Bare Ridge, 1870.....	42 02 00.318 124 13 45.997	9.8 1058.0	76 18 55.5 138 51 16.3	256 17 58.5 318 50 44.2	Red Point..... Pine Hill.....	2015.1 1674.8	3. 301305 3. 2229.3
North Winchuck, 1870.....	42 00 50.449 124 13 47.740	1556.5 1098.5	124 03 54.7 131 12 00.0 181 03 56.0	304 01 30.4 311 11 04.2 1 03 57.2	North Chetko..... Red Point..... Bare Ridge.....	5981.9 2548.9 2156.1	3. 776836 3. 406356 3. 333660
Rocky Butte, 1870.....	42 01 19.155 124 14 06.682	591.0 153.7	118 09 16.6 200 32 16.6 333 47 49.1	298 08 33.5 20 32 30.5 153 48 01.8	Red Point..... Bare Ridge..... North Winchuck.....	1681.0 1356.2 987.1	3. 225565 3. 132339 2. 994351
Otto, 1870.....	42 01 33.428 124 13 37.672	1031.4 866.6	9 54 36.0 56 35 00.8 167 00 07.0	189 54 29.3 236 34 41.4 347 00 01.5	North Winchuck..... Rocky Butte..... Bare Ridge.....	1346.1 799.6 851.4	3. 129087 2. 902883 2. 930157
Henderson, 1870.....	42 00 56.086 124 12 42.023	1728.9 966.9	83 30 09.5 110 07 12.4 132 01 35.4	263 29 25.5 290 06 15.7 312 00 58.1	North Winchuck..... Rocky Butte..... Otto.....	1521.9 2074.3 1723.4	3. 182388 3. 316876 3. 236393
Oregon-California Boundary Monument, 1869.	41 59 55.730 124 12 29.498	1719.6 678.9	15 39 34.6 133 09 39.9 171.14 42.3	195 39 11.7 313 08 47.5 351 11 33.9	Cone Rock..... North Winchuck..... Henderson.....	2911.5 2468.1 1882.7	3. 464116 3. 392363 3. 274770
Northwest Seal Rock, 1870.....	41 50 14.746 124 22 27.675	454.9 638.6	196 57 25.7 205 14 41.0 211 22 08.3	17 00 49.2 25 19 32.7 31 27 55.8	North Chetko..... Red Point..... North Winchuck.....	24009.5 23548.0 22982.6	4. 380783 4. 371954 4. 361400
Pyramid, 1870.....	41 57 05.256 124 12 16.910	162.2 389.5	48 05 02.5 155 05 11.3 163 15 32.4	227 58 14.7 335 03 14.8 343 14 31.7	Northwest Seal Rock..... Red Point..... North Winchuck.....	18938.1 9512.9 7255.7	4. 277336 3. 978715 3. 860681
Peak, 1870.....	41 59 15.294 124 11 22.289	471.9 513.2	131 15 56.0 149 27 04.4	311 14 18.7 329 26 11.1	North Winchuck..... Henderson.....	4452.5 3609.5	3. 648604 3. 557445
Cone Rock, 1870.....	41 58 24.872 124 13 03.631	767.4 83.6	167 16 01.5 236 17 41.6 336 20 30.4	347 15 32.0 56 18 49.4 156 21 01.6	North Winchuck..... Peak..... Pyramid.....	4604.8 2804.2 2681.6	3. 663217 3. 447802 3. 428401
Boulder, 1870.....	41 59 35.258 124 11 49.379	1087.8 1136.6	38 12 49.9 314 38 45.3	218 12 00.2 134 39 03.4	Cone Rock..... Peak.....	2763.7 876.5	3. 441784 2. 942772

Chetko River to Trinidad Head—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Bush, 1870.....	41 59 27.060 124 12 20.484	834.9 471.5	27 22 27.8 250 32 21.8	207 21 58.9 70 32 42.6	Cono Rock..... Boulder.....	Meters. 2160.6 759.3	3.334566 2.880426
Hillsido, 1870.....	41 58 34.853 124 11 43.798	1075.3 1008.4	80 29 47.6 152 20 05.4 176 03 24.4	260 28 54.2 332 19 40.9 356 03 20.7	Cono Rock..... Bush..... Boulder.....	1863.7 1818.7 1868.1	3.270370 3.259766 3.271403
Low Dune, 1870.....	41 57 34.487 124 12 19.209	1064.0 442.4	356 38 23.9 321 54 05.6	176 38 25.5 141 54 18.9	Pyramid..... Head.....	903.4 742.3	2.955890 2.870593
Island, 1870.....	41 57 05.600 124 12 51.773	172.8 1192.5	220 04 37.8 270 45 14.9 355 40 59.0	40 04 59.6 90 45 38.3 175 41 16.5	Low Dune..... Pyramid..... Cone.....	1164.8 803.0 8001.3	3.066258 2.904741 3.903159
Cone, 1870.....	41 52 46.998 124 12 25.653	1449.9 591.5	71 21 58.1 181 26 51.8	251 15 16.4 1 26 57.6	Northwest Seal Rock..... Pyramid.....	14659.0 7970.5	4.166104 3.901487
Head, 1870.....	41 57 15.553 124 11 59.322	479.9 1366.3	51 53 48.8 75 44 35.5 141 54 18.9	231 53 37.1 255 44 00.4 321 54 05.6	Pyramid..... Island..... Low Dune.....	514.8 1246.5 742.3	2.711635 3.095678 2.870593
Last, 1870.....	41 58 21.462 124 12 14.808	662.2 341.0	4 00 00.8 19 59 22.0	183 59 57.9 199 58 57.3	Low Dune..... Island.....	1452.8 2490.6	3.162222 3.396296
Patch, 1870.....	41 57 48.531 124 11 39.584	1497.3 911.6	24 04 28.4 64 36 12.8 141 24 11.3	204 04 15.2 244 35 46.3 321 23 47.7	Head..... Low Dune..... Last.....	1114.4 1040.2 1300.1	3.047042 3.004390 3.113962
East, 1870.....	41 56 52.294 124 11 06.284	1613.4 144.7	13 35 40.5 99 36 01.2 103 49 07.6	193 34 47.5 279 34 50.7 283 48 20.4	Cone..... Island..... Pyramid.....	7786.0 2464.2 1675.2	3.894342 3.391688 3.224055
Low Rock, 1870.....	41 55 58.566 124 13 21.755	1806.9 501.2	198 27 48.7 215 58 21.5 242 00 41.1 347 39 14.7	18 28 08.6 35 59 04.8 62 02 11.6 167 39 52.2	Island..... Pyramid..... East..... Cone.....	2180.5 2542.6 3533.7 6050.2	3.338550 3.405283 3.548227 3.781770
Spur, 1870.....	41 55 25.730 124 12 04.803	793.8 110.7	119 45 01.7 174 48 40.9 182 08 01.8 206 46 42.8	299 44 10.3 354 48 32.8 2 08 05.4 26 47 21.9	Low Rock..... Pyramid..... Head..... East.....	2042.0 3083.3 3390.7 2991.7	3.310065 3.489018 3.530291 3.475922
Great Sand Dune, 1870.....	41 53 44.970 124 12 06.720	1387.5 154.9	13 42 59.2 157 14 50.6 193 32 31.6	193 42 46.6 337 14 00.5 13 33 12.0	Cone..... Low Rock..... East.....	1841.1 4469.9 5944.9	3.265073 3.650294 3.774144
Indian, 1870.....	41 49 06.758 124 13 44.162	208.5 1049.3	99 53 54.3 194 55 01.6	279 48 05.2 14 55 54.0	Northwest Seal Rock..... Cone.....	12261.5 7032.1	4.088549 3.847088
Eureka, 1870.....	41 51 41.421 124 11 40.072	1277.9 924.2	30 58 30.2 152 33 01.1	210 57 07.4 332 32 30.7	Indian..... Cone.....	5564.7 2280.0	3.745442 3.357933
Lake End, 1870.....	41 51 54.047 124 12 36.554	1667.4 843.0	188 44 47.3 286 38 33.5	8 44 54.6 106 39 11.2	Cone..... Eureka.....	1652.9 1359.7	3.218250 3.133436
Lake Earl north base, 1870.....	41 52 02.954 124 12 07.228	91.1 166.7	316 41 06.1 67 53 25.7	136 41 24.2 247 53 06.1	Eureka..... Lake End.....	913.0 730.0	2.960478 2.863340
Lake Earl south base, 1870.....	41 51 34.345 124 12 15.069	1059.6 347.6	140 48 52.3 191 34 39.5	320 48 38.0 11 34 44.7	Lake End..... Lake Earl north base.....	794.2 901.0	2.894454 2.954720
Gravel, 1870.....	41 50 36.935 124 13 06.790	1139.5 156.7	196 20 10.5 225 08 51.8 17 13 28.3	16 20 30.6 45 09 49.7 197 13 03.4	Lake End..... Eureka..... Indian.....	2479.2 2821.3 2912.7	3.394308 3.450449 3.464302
Burnt Ranch, ¹ 1870.....	41 54 26.56 124 11 44.33	819.5 1021.7	141 40 06 191 01 46	321 39 01 11 02 11	Low Rock..... East.....	3619.0 4580.8	3.558586 3.660943
Ridge, 1870.....	41 50 48.698 124 11 31.683	1502.4 731.0	80 37 01.6 173 12 56.7	260 35 58.1 353 12 51.1	Gravel..... Eureka.....	2224.0 1638.1	3.347130 3.214337
Lake Mound, 1870.....	41 50 05.368 124 12 34.837	165.6 803.9	41 30 23.0 142 52 38.6 179 19 22.3	221 29 36.8 322 52 17.3 359 19 21.1	Indian..... Gravel..... Lake End.....	2114.4 1221.5 3353.2	3.382801 3.086892 3.525460
Squaw, 1870.....	41 49 27.188 124 12 17.849	838.8 414.9	72 26 57.6 152 18 51.0 202 57 10.8	252 26 00.0 332 18 18.3 22 57 41.6	Indian..... Gravel..... Ridge.....	2089.4 2430.2 2731.1	3.320016 3.385637 3.436334
Red Point, 1870.....	41 49 07.973 124 10 35.419	246.0 817.5	104 05 15.8 157 19 52.9 162 31 01.0	284 04 07.5 337 19 15.4 342 30 18.0	Squaw..... Ridge..... Eureka.....	2437.2 3367.9 4958.7	3.386887 3.527358 3.695366
Swamp, 1870.....	41 48 15.844 124 11 50.411	488.8 1163.7	163 57 02.5 227 05 51.7	343 56 44.2 47 06 41.7	Squaw..... Red Point.....	2290.4 2362.8	3.359944 3.373430
Lake, 1870.....	41 49 49.435 124 13 23.652	1525.2 545.8	194 51 58.0 246 25 09.8 19 46 26.0	14 52 09.2 66 25 42.3 199 46 12.3	Gravel..... Lake Mound..... Indian.....	1516.2 1229.0 1399.2	3.180766 3.089546 3.145873
Yank, 1870.....	41 49 14.948 124 13 00.864	461.2 19.9	77 48 46.9 153 42 00.6	255 48 18.0 333 41 45.4	Indian..... Lake.....	1030.7 1186.9	3.013155 3.074404

¹ No check on this position.

Chetko River to Trinidad Head—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
Pine Bush, 1870.....	41 48 43.429	1339.8	174 50 45.9	354 50 44.0	Indian.....	Meters. 722.7	2.858942
	124 13 41.350	954.4	223 51 14.9	43 51 41.9	Yank.....	1348.6	3.129893
Pond, 1870.....	41 48 31.998	987.2	80 46 59.6	260 46 48.2	Hut.....	398.4	2.600287
	124 13 42.083	971.4	133 53 38.1	313 53 29.2	Stiek.....	425.3	2.628737
			182 44 38.6	2 44 39.9	Pine Bush.....	353.1	2.547898
			1 35 58.5	181 35 57.9	Forest Mound.....	682.1	2.833848
Stiek, 1870.....	41 48 41.555	1282.0	198 23 12.6	18 23 20.1	Indian.....	819.4	2.913490
	124 13 55.361	1277.8	259 51 56.4	79 52 05.8	Pine Bush.....	328.5	2.516587
Hut, 1870.....	41 48 29.929	923.3	193 35 14.8	13 35 17.3	Stiek.....	369.0	2.567074
	124 13 59.117	1364.6	224 33 19.4	44 33 31.3	Pine Bush.....	584.5	2.766812
Round, 1870.....	41 48 24.588	758.6	134 00 09.4	314 00 04.5	Hut.....	237.2	2.375169
	124 13 51.725	1194.0	170 53 28.7	350 53 26.3	Stiek.....	530.2	2.724437
Skull, 1870.....	41 48 08.752	270.0	204 26 26.6	24 26 35.2	Hut.....	717.7	2.855936
	124 14 11.982	276.6	223 44 33.0	43 44 46.5	Round.....	676.3	2.830130
Forest Mound, 1870.....	41 48 09.898	305.3	86 59 14.9	266 58 55.5	Skull.....	672.1	2.827449
	124 13 42.908	990.5	148 48 24.8	328 48 14.0	Hut.....	722.5	2.858824
Pine, 1870.....	41 47 56.611	1746.5	160 52 57.8	340 52 54.0	Skull.....	396.4	2.598185
	124 14 06.358	146.8	232 51 50.8	52 52 06.4	Forest Mound.....	679.1	2.831912
Flag, 1870.....	41 47 55.943	1725.9	201 06 30.3	21 06 34.7	Skull.....	423.6	2.626956
	124 14 18.590	429.2	265 49 41.2	85 49 49.4	Pine.....	283.2	2.452024
Firknoll, 1870.....	41 47 45.687	1409.5	161 31 30.9	341 31 27.8	Flag.....	333.6	2.523275
	124 14 14.011	323.5	207 39 50.5	27 39 55.6	Pine.....	380.5	2.580400
Drift, 1870.....	41 47 47.303	1459.3	206 46 11.9	26 46 15.8	Flag.....	298.6	2.475042
	124 14 24.415	563.7	281 43 44.1	101 43 51.1	Firknoll.....	245.2	2.389762
Knob, 1870.....	41 47 37.635	1161.1	170 21 32.6	350 21 31.1	Drift.....	302.6	2.480809
	124 14 22.220	513.0	217 20 39.7	37 20 45.2	Firknoll.....	312.5	2.494802
Sand, 1869.....	41 47 35.525	1096.0	197 16 28.2	17 16 31.9	Drift.....	380.6	2.580417
	124 14 29.310	676.8	248 18 35.0	68 18 40.3	Knob.....	176.2	2.245898
			32 56 57.2	212 56 28.1	St. George.....	1857.4	3.268899
			114 01 44.0	293 56 25.1	Northwest Seal Rock.....	12084.7	4.082235
St. George, 1869.....	41 46 45.004	1388.4	122 51 43.1	302 46 53.4	Northwest Seal Rock.....	11938.5	4.076950
	124 15 13.054	301.5	205 07 49.2	25 08 48.5	Indian.....	4831.0	3.684037
St. George north base, 1869.....	41 47 00.057	1.8	52 10 20.5	232 10 03.3	St. George.....	757.2	2.879235
	124 14 47.154	1088.9	200 37 56.1	20 38 08.0	Sand.....	1169.3	3.067913
Woodedge, 1870.....	41 47 23.680	730.5	42 28 23.1	222 28 03.8	St. George north base.....	988.1	2.994779
	124 14 18.263	421.7	145 05 16.0	325 05 08.6	Sand.....	445.7	2.649001
			168 01 06.7	348 01 03.7	Knob.....	440.1	2.643591
Mound, 1869.....	41 46 46.728	1441.7	87 25 58.3	267 25 24.2	St. George.....	1185.5	3.073914
	124 14 21.771	502.8	125 03 09.2	305 02 52.3	St. George north base.....	716.1	2.854955
			173 24 13.7	353 24 08.7	Sand.....	1515.4	3.180564
			184 03 45.6	4 03 48.0	Woodedge.....	1142.9	3.058015
Shell, 1869.....	41 47 06.900	212.9	245 03 22.9	65 03 55.0	Woodedge.....	1227.8	3.089121
	124 15 06.477	149.6	295 19 08.9	115 19 21.8	St. George north base.....	493.6	2.693384
			12 40 19.0	192 40 14.6	St. George.....	692.4	2.840362
St. George south base, 1869.....	41 46 39.129	1207.2	112 10 39.1	292 10 26.3	St. George.....	480.2	2.681453
	124 14 53.798	1242.5	193 21 50.9	13 21 55.3	St. George north base.....	663.7	2.821952
			252 24 32.0	72 24 53.3	Mound.....	775.9	2.889816
Castle Rock, 1869.....	41 45 41.887	1292.2	170 33 23.9	350 33 14.6	St. George.....	1974.0	3.295356
	124 14 59.029	1363.6	191 04 25.4	11 04 45.2	Sand.....	3572.5	3.552975
Connection Rock, 1869.....	41 44 51.355	1584.3	132 07 46.1	312 06 56.4	Castle Rock.....	2321.4	3.366308
	124 13 44.406	1026.0	149 43 20.2	329 42 21.2	St. George.....	4060.5	3.608575
			278 35 14.0	98 36 18.4	Crescent City Lighthouse.....	2255.4	3.353229
Preston 2, 1869.....	41 45 05.210	160.7	69 57 25.9	249 56 52.1	Connection Rock.....	1246.9	3.095834
	124 12 53.708	1240.9	111 21 33.6	291 20 10.1	Castle Rock.....	3108.5	3.492547
			305 49 57.8	125 50 28.4	Crescent City Lighthouse.....	1305.9	3.115897
Wynell, 1869.....	41 46 13.652	421.2	47 23 07.4	227 22 36.7	Castle Rock.....	1447.3	3.160568
	124 14 12.921	298.4	124 51 41.5	304 51 01.5	St. George.....	1692.5	3.228518
			168 40 28.4	348 40 22.5	Mound.....	1040.7	3.017340
			319 04 51.8	139 05 44.6	Preston 2.....	2794.1	3.446247
			345 27 10.6	165 27 29.6	Connection Rock.....	2623.1	3.418812
White, 1869.....	41 46 24.913	768.6	138 38 10.0	318 37 54.3	St. George.....	825.0	2.916929
	124 14 49.421	1141.4	223 29 32.8	43 29 51.2	Mound.....	927.8	2.967443
			292 23 38.2	112 24 02.5	Wynell.....	911.8	2.959907
Point, 1869.....	41 46 20.949	646.3	158 40 50.7	338 40 42.4	St. George.....	796.7	2.901269
	124 15 00.513	11.8	214 28 52.3	64 28 59.7	White.....	283.9	2.453120
			281 34 13.9	101 34 45.6	Wynell.....	1122.0	3.050009

Chetko River to Trinidad Head—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Principal points—Continued.</i>							
	° ' "		° ' "	° ' "		<i>Meters.</i>	
Crescent City Lighthouse, 1913	41 44 40.428 124 12 07.890	1247.3 182.3	257 22 43.1 287 24 35.4	77 36 04.8 107 31 34.1	Gordon..... Child.....	28468.3 15245.1	4.454862 4.183130
Crescent City azimuth, 1871.....	41 44 49.567 124 12 00.553	1529.2 12.8	91 19 36.7 352 25 01.9	271 18 27.5 172 25 05.2	Connection Rock..... Steamboat Rock.....	2400.2 869.6	3.380249 2.930334
Battery Point 2, 1869.....	41 44 47.308 124 11 59.246	1459.5 1368.9	43 15 46.7 92 57 06.3 113 42 09.1	223 15 41.1 272 55 56.3 293 41 32.9	Crescent City Lighthouse..... Connection Rock..... Preston 2.....	291.4 2433.0 1374.2	2.464563 3.386142 3.138659
Steamboat Rock, 1859.....	41 44 21.626 124 11 55.587	667.2 1284.6	110 03 01.9 135 02 28.3	290 01 49.4 315 01 49.5	Connection Rock..... Preston 2.....	2676.5 1900.4	3.427572 3.278850
Whalers Island, 1859.....	41 44 25.975 124 11 00.574	801.4 13.3	83 58 47.4 117 42 46.0	263 58 10.8 297 42 06.1	Steamboat Rock..... Crescent City azimuth.....	1278.3 1565.4	3.106636 3.194630
Smyth 2, 1871.....	41 44 47.190 124 10 36.097	1455.9 834.1	40 50 03.4 92 09 36.2	220 49 47.1 272 08 40.0	Whalers Island..... Crescent City azimuth.....	865.0 1952.8	2.937033 3.290658
Ehroser 2, 1871.....	41 44 19.732 124 09 40.938	608.8 946.0	95 58 57.8 123 36 52.7	275 58 04.8 303 36 16.0	Whalers Island..... Smyth 2.....	1850.3 1530.4	3.267245 3.184808
Round Rock, 1859.....	41 43 56.772 124 11 25.800	1751.5 596.3	216 26 14.8 233 41 47.1	36 26 47.9 73 42 56.9	Smyth 2..... Ehroser 2.....	1933.6 2524.7	3.286361 3.402218
Alexander, 1871.....	41 43 14.978 124 08 51.679	462.1 1194.5	109 54 47.4 150 19 37.7	289 53 04.8 320 19 04.9	Round Rock..... Ehroser 2.....	3788.4 2299.4	3.578455 3.361614
Crescent City northeast base, 1859.....	41 45 09.589 124 11 21.639	295.8 499.9	27 55 52.8 340 06 43.5	207 55 30.2 160 06 57.5	Steamboat Rock..... Whalers Island.....	1674.8 1430.9	3.223960 3.155602
Smyth, 1859.....	41 44 47.195 124 10 36.100	1456.1 834.1	40 49 27.6 66 45 52.7 123 17 40.8	220 49 11.3 246 44 59.8 303 17 10.5	Whalers Island..... Steamboat Rock..... Crescent City northeast base.....	865.1 1999.0 1258.7	2.937009 3.300803 3.099930
Crescent City southwest base, 1859.....	41 44 52.893 124 11 59.807	1631.8 1381.9	239 42 27.4 275 11 11.1 301 14 34.9	59 42 52.8 95 12 06.8 121 15 14.3	Crescent City northeast base..... Smyth..... Whalers Island.....	1021.3 1042.1 1600.9	3.009136 3.288265 3.204369
Crescent City astronomical, ¹ 1853.....	41 44 49.40 124 12 00.36	1524.1 8.3	235 08 44 297 36 35	55 09 10 117 37 15	Crescent City northeast base..... Whalers Island.....	1090.1 1559.0	3.037456 3.192840
Battery, 1859.....	41 44 47.313 124 11 59.294	1459.7 1370.0	231 41 23.7 295 52 28.7 353 49 51.7	51 41 48.8 115 53 07.5 173 49 54.2	Crescent City northeast base..... Whalers Island..... Steamboat Rock.....	1108.7 1508.1 797.1	3.044819 3.178427 2.901510
Preston, ¹ 1859.....	41 45 05.16 124 12 53.74	159.2 1241.6	294 47 58 314 58 40	114 49 14 134 59 19	Whalers Island..... Steamboat Rock.....	2889.7 1899.8	3.459505 3.278708
Sister Rock, 1871.....	41 39 31.646 124 08 39.810	976.3 921.1	154 52 35.2 177 43 11.6	334 50 44.8 357 43 03.7	Round Rock..... Alexander.....	9035.4 6895.6	3.955947 3.838573
Long Point, 1871.....	41 40 26.297 124 08 05.721	811.3 132.3	25 04 13.3 144 33 06.2	205 03 50.6 324 30 53.1	Sister Rock..... Round Rock.....	1861.4 7972.8	3.269835 3.901613
White Knob, 1871.....	41 42 27.488 124 08 34.233	848.0 791.4	124 47 56.4 164 36 42.5	304 46 02.3 344 36 31.0	Round Rock..... Alexander.....	4828.6 1519.7	3.683823 3.181747
Woody Point, 1871.....	41 41 21.703 124 08 10.406	669.6 242.7	356 18 11.7 11 17 48.3 136 40 30.2 164 52 09.5	176 18 14.9 191 17 28.7 316 38 20.3 344 51 53.7	Long Point..... Sister Rock..... Round Rock..... White Knob.....	1712.9 3462.4 6578.4 2102.5	3.233731 3.539382 3.818118 3.322733
Green, 1871.....	41 40 09.370 124 08 00.109	289.1 2.5	38 17 00.0 166 02 26.7	218 16 33.6 346 02 23.0	Sister Rock..... Long Point.....	1482.6 538.1	3.171031 2.730861
Bush, 1871.....	41 39 37.617 124 07 50.801	1160.5 1175.4	80 46 35.8 167 36 10.3	260 46 03.2 347 36 04.1	Sister Rock..... Green.....	1148.8 1003.0	3.060239 3.001312
Point, 1871.....	41 36 59.217 124 06 51.096	1826.9 1183.0	151 51 39.0 164 12 59.2	331 50 26.8 344 12 19.5	Sister Rock..... Bush.....	5333.4 5078.4	3.727007 3.705731
Grant, 1871.....	41 37 41.874 124 06 39.275	1291.8 909.1	11 44 52.5 140 31 59.7	191 44 44.6 320 30 39.6	Point..... Sister Rock.....	1344.2 4387.5	3.128457 3.642218
Low, 1871.....	41 37 59.857 124 07 04.434	1846.6 103.8	313 33 12.3 350 35 34.0 142 05 22.0	133 33 29.1 170 95 42.9 322 04 18.7	Grant..... Point..... Sister Rock.....	805.2 1896.3 3589.6	2.905887 3.277914 3.555049
Near, 1871.....	41 39 32.346 124 07 48.294	997.9 1117.4	340 26 43.0 88 57 59.2 160 22 04.6	160 26 40.2 268 57 25.0 340 22 03.0	Low..... Sister Rock..... Bush.....	3028.3 1192.1 172.7	3.481198 3.076326 2.237182
Wilson, 1871.....	41 36 46.403 124 06 06.602	1434.4 152.9	110 51 46.3 156 07 23.9	290 51 16.8 336 07 02.2	Point..... Grant.....	1102.4 1868.5	3.042346 3.271495
Last, 1871.....	41 35 57.795 124 05 57.022	1783.0 1320.5	146 32 58.6 171 36 05.4	326 32 22.7 351 35 59.0	Point..... Wilson.....	2271.2 1518.7	3.356263 3.181468
Rock, 1872.....	41 34 46.378 124 07 20.190	1430.8 467.7	189 20 01.8 221 09 20.3 326 23 29.4 334 15 37.5	9 20 21.1 41 10 15.5 146 25 21.7 154 17 20.8	Point..... Last..... Flint Ridge..... High Bluff.....	4153.2 2926.6 7217.9 8319.0	3.618386 3.466370 3.858409 3.920071

¹ No check on this position.

Chetko River to Trinidad Head—Continued.

Station.	Latitude and longitude.	Sec-onds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Loga-rithm.
<i>Principal points—Continued.</i>							
	° ' "		° ' "	° ' "		<i>Meters.</i>	
Halfway, 1872.....	41 34 41.206 124 05 45.638	1271.2 1057.3	94 10 30.7 173 38 00.4	274 09 28.0 353 37 52.9	Rock..... Last.....	2196.2 2377.5	3.341069 3.376124
Pine Ridge, 1873.....	41 34 09.251 124 05 52.582	285.4 1218.3	119 26 43.5 189 16 00.0 346 00 54.9 14 46 24.8	299 25 45.4 9 16 04.6 166 01 40.0 194 43 14.3	Rock..... Halfway..... High Bluff..... Redding Rock.....	2330.6 998.9 6542.8 26239.8	3.367461 2.999513 3.815765 4.418900
Council Mound, 1872.....	41 33 34.785 124 05 07.820	1073.2 181.2	346 18 53.1 177 14 28.8 125 40 21.2 135 43 00.3	166 19 19.5 174 08 14.2 305 44 53.4 315 42 30.6	Flint Ridge..... High Bluff..... Rock..... Pine Ridge.....	3914.8 5313.6 3779.6 1485.4	3.592711 3.725387 3.577490 3.171835
Flint Rock, 1872.....	41 31 29.993 124 04 59.815	923.3 1386.9	151 46 44.1 354 07 58.8 266 25 24.9 346 01 03.9	331 45 11.1 357 14 23.6 86 25 46.1 166 01 14.1	Rock..... Council Mound..... Flint Ridge..... High Bluff.....	6876.9 3854.4 742.0 1479.6	3.837391 3.585962 2.870424 3.170150
Council Point, 1872.....	41 33 33.554 124 05 29.577	1035.2 685.4	131 14 58.9 265 41 08.5 349 44 21.8	311 13 45.5 85 41 23.0 169 44 41.5	Rock..... Council Mound..... Flint Rock.....	3408.2 505.6 3873.9	3.532526 2.703799 3.588146
Klamath South, 1872.....	41 31 56.408 124 04 32.865	1740.2 761.9	37 28 51.0 143 32 02.1 156 19 28.3 165 03 26.5	217 28 33.1 323 30 11.2 336 18 50.8 345 03 03.4	Flint Rock..... Rock..... Council Point..... Council Mound.....	1026.8 6521.8 3272.7 3141.4	3.011493 3.814365 3.514900 3.497124
Redding Rock, 1874.....	41 20 26.686 124 10 40.353	823.3 938.2	194 43 14.3 203 26 49.7	14 46 24.8 23 30 45.2	Pine Ridge..... High Bluff.....	26239.8 20745.0	4.418900 4.316913
Split Rock, 1874.....	41 29 43.051 124 04 20.482	1328.1 475.1	27 14 13.0 163 25 33.3	207 10 01.7 343 25 17.4	Redding Rock..... High Bluff.....	19298.3 1944.2	3.285519 3.288745
Alder Butte, 1874.....	41 28 29.251 124 03 45.114	902.4 1046.8	32 58 31.8 160 11 03.0 354 23 23.5	212 53 57.1 340 10 39.5 174 23 31.0	Redding Rock..... Split Rock..... Johnson.....	17738.3 2420.1 2681.7	4.248912 3.383829 3.428410
Johnson, 1874.....	41 27 02.741 124 03 33.821	84.6 785.0	39 04 50.5 166 29 04.7 174 23 31.0	219 00 08.5 346 28 18.0 354 23 23.5	Redding Rock..... High Bluff..... Alder Butte.....	15731.2 7003.2 2681.7	4.196763 3.845294 3.428410
Upper Bluff, 1874.....	41 24 19.193 124 03 47.188	592.1 1096.1	53 16 36.0 183 31 09.4	233 12 02.9 3 31 18.2	Redding Rock..... Johnson.....	11985.0 5055.0	4.078639 3.703723
Mussel Point, 1874.....	41 19 21.411 124 05 05.405	660.5 125.7	104 31 35.1 191 11 11.9	284 27 53.9 11 12 03.6	Redding Rock..... Upper Bluff.....	8045.0 9364.7	3.905524 3.971493
Sharp Point, 1874.....	41 14 12.724 124 06 27.801	392.5 647.4	153 01 44.1 191 22 38.9	332 58 57.4 11 23 33.3	Redding Rock..... Mussel Point.....	12947.1 9713.9	4.112171 3.987395
Big Lagoon, 1870.....	41 09 26.477 124 08 10.254	816.8 239.1	170 16 37.4 195 07 08.7	350 14 58.4 15 08 16.2	Redding Rock..... Sharp Point.....	20664.6 9147.4	4.315226 3.961299
Patricks Pinnacle, 1870.....	41 08 21.482 124 09 35.378	662.7 825.1	201 57 14.8 224 42 17.7	21 59 18.3 44 43 13.7	Sharp Point..... Big Lagoon.....	11684.0 2821.4	4.067592 3.450468
Inner Turtle Rock, 1870.....	41 07 54.448 124 10 57.108	1679.7 1332.0	233 52 11.9 246 21 49.3	53 54 01.7 66 22 43.1	Big Lagoon..... Patricks Pinnacle.....	4816.7 2080.7	3.682749 3.318206
Patricks Point South, 1870.....	41 07 48.600 124 09 49.541	1493.3 1155.5	96 32 10.6 198 02 12.9	276 31 26.2 18 02 22.2	Inner Turtle Rock..... Patricks Pinnacle.....	1586.3 1066.8	3.200388 3.028981
Castle, 1870.....	41 08 19.764 124 09 19.110	609.7 445.6	36 26 25.9 71 08 40.8 97 57 09.0 217 57 18.9	216 20 05.9 251 07 36.4 277 56 58.3 37 58 04.2	Patricks Point south..... Inner Turtle Rock..... Patricks Pinnacle..... Big Lagoon.....	1195.0 2415.4 383.1 2610.3	3.077364 3.382990 2.583293 3.416688
Outer Turtle Rock, 1870.....	41 08 00.281 124 11 01.799	8.7 42.0	236 22 22.7 252 00 55.1 255 54 12.4	56 24 15.6 72 01 52.0 75 55 20.0	Big Lagoon..... Patricks Pinnacle..... Castle.....	4803.6 2119.1 2469.3	3.681562 3.326148 3.392576
Bight Tree, 1870.....	41 08 34.170 124 08 37.560	1054.1 876.0	65 22 03.5 73 49 07.9 201 31 54.6	245 21 36.2 253 48 29.9 21 32 12.6	Castle..... Patricks Pinnacle..... Big Lagoon.....	1066.1 1494.1 1734.7	3.027781 3.147388 3.239227
Sugar Loaf, 1870.....	41 08 19.019 124 09 18.294	586.7 426.6	37 50 17.8 100 47 58.2 140 22 57.5 217 19 00.8	217 49 57.3 280 47 47.0 320 22 57.0 37 19 45.6	Patricks Point south..... Patricks Pinnacle..... Castle..... Big Lagoon.....	1188.1 405.6 29.9 2616.9	3.074870 2.608123 1.475084 3.417783
<i>Supplementary points.</i>							
Long Rock, 1869.....	41 48 09.192 124 17 47.627	283.6 1099.5	282 45 47.1 308 00 10.9 319 23 50.7	102 47 59.3 128 02 19.6 139 25 43.1	Sand..... White..... Castle Rock.....	4695.0 5223.3 5984.4	3.671632 3.717948 3.777019
Southwest Seal Rock, point B, 1869..	41 48 52.104 124 21 03.572	1607.5 82.4	284 30 54.5 295 49 11.6 304 50 58.2	104 35 17.3 115 53 05.3 124 55 01.1	Sand..... St. George..... Castle Rock.....	9403.3 8992.7 10261.4	3.973280 3.953890 4.011208
Whale Rock, 1869.....	41 47 40.854 124 19 02.909	1260.4 67.2	271 27 55.6 287 57 51.5 303 04 06.0	91 30 57.9 108 00 24.7 123 06 48.5	Sand..... St. George..... Castle Rock.....	6319.2 5580.4 6722.7	3.800664 3.746662 3.827542

Chetko River to Trinidad Head—Continued.

Station.	Latitude and longitude.	Seconds in meters.	Azimuth.	Back azimuth.	To station.	Distance.	Logarithm.
<i>Supplementary points—Continued.</i>							
	° ' "		° ' "	° ' "		<i>Meters.</i>	
Star Rock, 1869.....	41 46 32.311 124 17 27.814	996.8 642.4	244 39 47.0 262 48 57.6 294 20 29.0	64 41 45.9 82 50 27.4 114 22 08.1	Sand..... St. George..... Castle Rock.....	4560.2 3136.8 3772.3	3.658980 3.496489 3.576611
Mussel Rock, 1869.....	41 48 14.706 124 18 22.678	453.7 523.5	282 37 26.7 302 16 44.4 315 03 14.3	102 40 02.2 122 18 50.8 135 05 30.0	Sand..... St. George..... Castle Rock.....	5521.7 5179.7 6659.3	3.742076 3.714304 3.823427
Southwest Seal Rock, point A, 1869.....	41 48 50.583 124 21 03.119	1560.6 72.0	284 15 13.8 295 34 45.0 297 28 44.6	104 19 36.3 115 38 38.8 117 32 53.7	Sand..... St. George..... White.....	9381.5 8962.9 9728.6	3.972273 3.952448 3.988050
Little Black Rock, 1869.....	41 50 14.271 124 22 31.241	440.3 720.8	293 43 08.4 302 30 33.1 308 47 23.2	113 48 29.7 122 35 25.3 128 52 24.6	Sand..... St. George..... Castle Rock.....	12154.0 11999.9 13402.2	4.084720 3.079177 4.127175
Flat Rock, 1869.....	41 47 56.630 124 18 19.419	1747.1 448.3	276 57 57.4 297 09 51.0 311 54 53.3	97 00 30.7 117 11 55.2 131 57 06.8	Sand..... St. George..... Castle Rock.....	5352.5 4837.5 6220.7	3.728557 3.684620 3.793841
Hump Rock, 1869.....	41 46 58.534 124 18 04.338	1805.9 100.2	257 02 06.3 276 00 28.6 298 54 12.1	77 04 29.5 96 02 22.7 118 56 15.5	Sand..... St. George..... Castle Rock.....	5094.7 3977.5 4889.8	3.707115 3.599610 3.689291
Small Rock, 1869.....	41 48 37.162 124 17 50.030	1146.5 1154.8	292 17 36.8 313 39 32.2 317 01 07.2	112 19 50.6 133 41 16.9 137 03 00.2	Sand..... St. George..... Point.....	5008.9 5011.0 5742.9	3.699738 3.699922 3.759129

For the convenience of the draftsmen of this office there are given the following unadjusted positions of stations, which are lost or for some other reason have no value except for the coordination of the old work:

TABLE OF POSITIONS OF LOST POINTS.

Coos Bay.

Station.	Latitude and longitude.	Seconds in meters.	Station.	Latitude and longitude.	Seconds in meters.
	° ' "			° ' "	
Woodland, 1861.....	43 23 58.71 124 17 41.38	1811.8 931.2	Isthmus, 1863.....	43 21 52.47 124 12 15.20	1619.3 342.3
Trail, 1861.....	43 25 16.47 124 17 36.47	508.3 820.4	Kitchen, 1863.....	43 22 17.05 124 10 55.11	526.2 1240.8
Wreck, 1861.....	43 23 55.09 124 18 24.94	1700.1 561.3	Marked tree No. 1, 1863.....	43 24 08.58 124 17 09.10	264.8 204.8
Yokam, 1861.....	43 20 38.95 124 21 35.37	1202.0 796.7	Marked tree No. 2, 1862.....	43 24 18.93 124 15 52.74	584.2 1186.7
Beach, 1861.....	43 23 20.65 124 13 11.03	637.3 248.3	Marked tree No. 3, 1862.....	43 25 29.83 124 15 56.59	920.9 1273.0
Beaver, 1862.....	43 24 26.69 124 14 06.03	823.7 135.7	Marked tree No. 4, 1862.....	43 24 58.72 124 15 12.52	1812.1 281.7
North Bend, 1862.....	43 25 14.55 124 13 03.45	449.2 77.6	Marked tree No. 5, 1862.....	43 25 39.63 124 15 18.64	1223.0 419.3
Bight, 1862.....	43 25 47.72 124 15 04.70	1472.7 105.7	Marked tree No. 6, 1862.....	43 24 04.51 124 13 56.21	139.2 1264.9
Bluff, 1862.....	43 24 40.58 124 11 45.49	1252.3 1023.5	Marked tree No. 7, 1862.....	43 27 02.63 124 13 27.89	81.1 627.1
Coal Bank, 1863.....	43 21 34.75 124 12 25.04	1072.8 563.9	North Sands, 1861.....	43 21 45.18 124 19 17.71	1394.3 398.8
Cooper, 1862.....	43 23 56.67 124 13 06.34	1748.9 142.7	Alder, 1861.....	43 22 40.70 124 17 19.87	1256.0 447.3
Crawford, 1863.....	43 23 22.55 124 11 10.60	695.9 238.6	Charleston, 1861.....	43 20 49.34 124 19 40.28	1522. 907.2
Hulet, 1863.....	43 22 51.58 124 13 13.07	1591.8 294.2	Coos Head, 1861.....	43 21 04.55 124 20 12.47	140.4 280.8
Island, 1863.....	43 22 48.58 124 10 25.09	1499.2 564.8	Dennis, 1861.....	43 23 00.79 124 18 58.55	24.4 1317.9

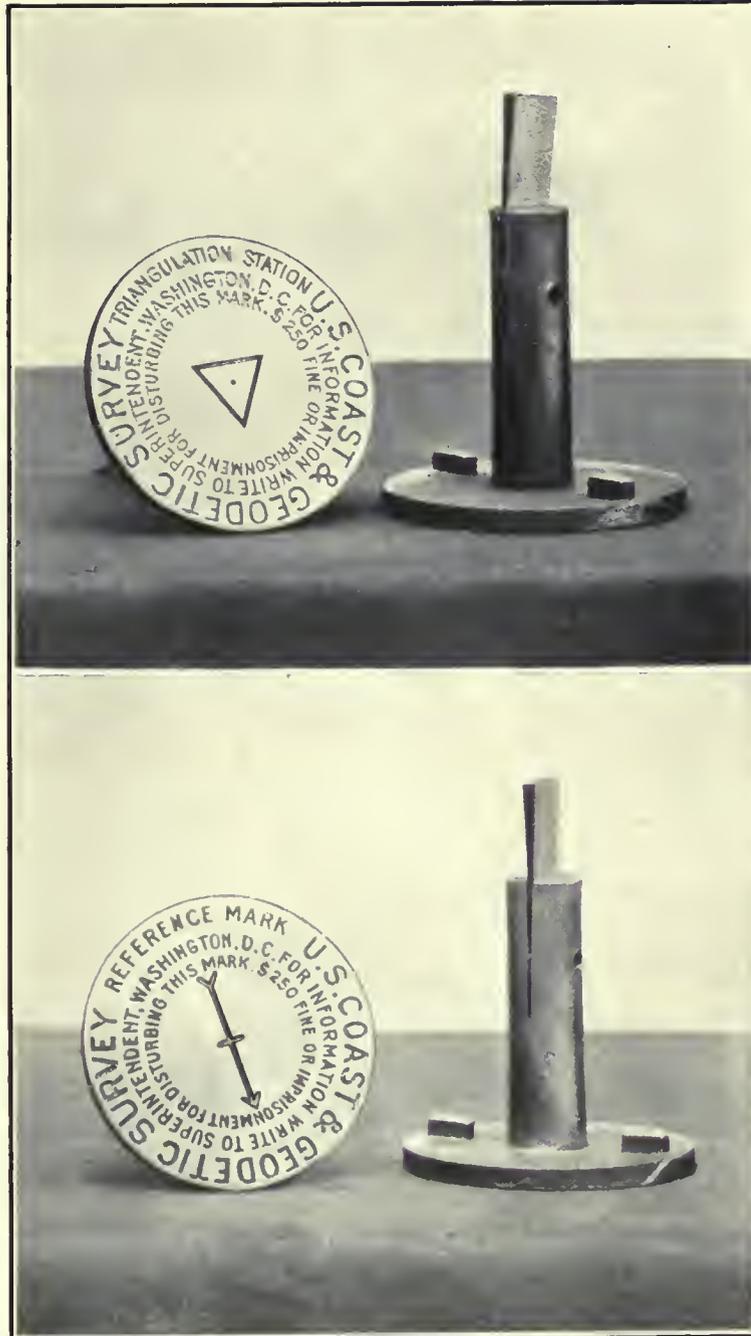


FIG. 3.—STANDARD TRIANGULATION STATION AND REFERENCE MARKS.

Coos Bay—Continued.

Station.	Latitude and longitude.			Seconds in meters.	Station.	Latitude and longitude.			Seconds in meters.
	°	'	"			°	'	"	
Duke, 1861.....	43	22	15.31	472.5	Marked tree No. 13, 1862.....	43	24	27.02	833.9
	124	17	39.70	893.8		124	11	53.03	1193.2
Empire, 1861.....	43	23	44.60	1376.9	Marked tree No. 14, 1862.....	43	24	53.45	1649.5
	124	16	32.21	724.9		124	13	08.62	193.9
Fossil, 1861.....	43	21	29.54	911.6	Marked tree No. 15, 1863.....	43	23	48.26	1489.3
	124	18	38.14	858.9		124	11	14.26	320.9
Garden, 1861.....	43	24	07.59	234.2	Marked tree No. 16, 1862.....	43	24	35.99	1110.7
	124	17	33.71	758.6		124	13	21.69	488.0
Gregory, 1861.....	43	20	38.79	1197.1	Marked tree No. 17, 1863.....	43	22	52.54	1621.4
	124	22	32.97	742.6		124	10	16.66	375.0
Dash, 1861.....	43	24	27.46	847.4	Marked tree No. 22, 1863.....	43	22	16.90	521.5
	124	18	05.59	125.8		124	12	40.37	908.9
Johnson, 1861.....	43	20	32.63	1007.0	Marked tree No. 24, 1863.....	43	21	59.99	1848.2
	124	19	20.34	458.2		124	10	41.96	944.8
Kenny, 1861.....	43	23	39.26	1211.6	Mound, 1862.....	43	24	27.02	833.9
	124	18	06.39	143.8		124	13	44.28	996.3
Lodge, 1861.....	43	23	01.95	60.2	Pine, 1862.....	43	26	46.53	1435.0
	124	17	00.30	6.8		124	13	58.50	1315.5
Marked tree A, 1861.....	43	23	02.45	75.6	Reed, 1863.....	43	21	57.24	1766.5
	124	18	19.42	437.1		124	12	42.59	959.0
Marked tree B, 1861.....	43	20	59.22	1827.6	Relief, 1862.....	43	24	46.91	1447.7
	124	19	45.65	1028.1		124	13	41.50	933.7
Marked tree Anderson, 1861.....	43	21	24.03	741.6	Slab, 1863.....	43	23	03.32	102.5
	124	18	43.26	974.2		124	10	33.77	760.1
Marked tree Mosman, 1861.....	43	21	11.83	365.1	Woodland 2, 1862.....	43	23	59.03	1821.7
	124	18	49.15	1106.9		124	17	41.35	930.5
Martin, 1861.....	43	22	55.49	1712.5	Mill, 1889.....	43	21	11.91	367.6
	124	18	42.21	950.2		124	11	38.22	860.7
Pigeon astronomic, 1861.....	43	21	41.64*	1285.0	Hardy's wharf.....	43	25	13.86	427.7
	124	18	14.64	329.7		124	12	00.24	5.4
Sallal, 1861.....	43	20	50.07	1545.2	Fridlund.....	43	24	57.78	1783.1
	124	18	55.31	1245.7		124	11	34.84	783.8
Siwash, 1861.....	43	20	22.02	679.6	Hagglund.....	43	23	57.43	1772.3
	124	19	07.45	167.8		124	11	28.77	647.4
Skiff, 1861.....	43	22	19.48	601.2	Hay Barn.....	43	25	20.98	647.5
	124	19	18.05	406.4		124	13	09.82	220.9
Whitewashed cliff, 1861.....	43	19	45.63	1408.2	Ross.....	43	21	10.35	319.4
	124	19	25.69	578.8		124	10	16.47	370.9
Whitewashed sapling, 1861.....	43	19	51.19	1579.8	Isthmus tree.....	43	21	56.22	1735.0
	124	19	09.17	206.6		124	11	37.54	845.3
Marshfield, 1863.....	43	22	30.26	933.8	Yokam 2.....	43	20	37.72	1164.1
	124	12	44.31	997.5		124	21	33.35	751.2
White, 1863.....	43	22	12.37	381.7	Empire Mill.....	43	23	49.35	1523.0
	124	11	53.65	1207.9		124	16	33.91	763.1
Merchant, 1862.....	43	25	06.86	211.7	Bay.....	43	23	52.39	1616.8
	124	13	05.09	114.5		124	17	21.64	487.0
Marked tree No. 8, 1862.....	43	24	39.34	1214.1	Timber Knob.....	43	24	05.48	169.1
	124	13	41.85	941.6		124	17	49.83	1122.5
Marked tree No. 10, 1862.....	43	24	54.05	1668.0	Coalbank tree.....	43	19	21.60	666.6
	124	13	33.51	753.9		124	17	17.86	402.4
Marked tree No. 11, 1862.....	43	25	55.26	1705.4	Snag.....	43	24	12.89	397.8
	124	12	26.27	590.9		124	12	38.04	856.0
Marked tree No. 12, 1864.....	43	25	18.73	578.0					
	124	13	06.73	151.4					

Tillamook Bay.

Station.	Latitude and longitude.	Seconds in meters.	Station.	Latitude and longitude.	Seconds in meters.
	° ' "			° ' "	
Marked tree No. 1, 1866.....	45 31 02.04 123 53 11.38	63.0 247.0	Pole No. 4, 1866.....	45 32 28.66 123 56 16.83	884.8 365.1
Marked tree No. 2, 1866.....	45 33 31.18 123 55 38.78	962.6 841.1	Beach, 1875.....	45 37 13.94 123 56 39.84	430.4 863.1
Marked tree No. 3, 1866.....	45 33 39.81 123 55 57.65	1229.0 1250.3	Rock off Cape Mears.....	45 29 46.51 123 59 01.74	1435.9 37.8
Marked tree No. 4, 1866.....	45 34 08.33 123 56 35.83	257.2 777.0	Morgan's dwelling.....	45 30 11.21 123 52 23.59	346.1 512.1
Pine, 1866.....	45 34 22.04 123 56 52.65	680.4 1141.6	House No. 1, south gable.....	45 29 09.59 123 51 33.89	296.1 736.1
Pole No. 1, 1866.....	45 30 14.07 123 53 51.55	434.4 1119.1	House No. 4, east gable.....	45 28 09.21 123 53 11.73	284.3 254.8
Pole No. 2, 1866.....	45 30 45.06 123 54 12.41	1391.1 269.4	House No. 5, north gable.....	45 28 22.87 123 53 37.38	706.1 812.0
Pole No. 3, 1866.....	45 31 30.29 123 54 29.53	935.1 640.8			

Columbia River.

Marked tree, Government Island, 1899.....	45 34 49.68 122 29 38.53	1533.9 835.3	Deer Island, 1878.....	45 57 40.78 122 49 14.49	1259.1 312.0
Sandhill tree, 1889.....	45 33 01.98 122 20 50.12	61.1 1087.2	Eversole, 1878.....	45 46 20.30 122 46 18.39	626.8 397.4
W. house, west gable, 1889.....	45 32 37.24 122 24 27.01	1149.8 585.9	Thicket, 1878.....	45 46 17.34 122 45 40.35	535.4 871.9
Bakers Bay, 1851.....	46 16 29.69 123 56 40.06	916.7 857.9	Willow Bar, 1878.....	45 45 49.17 122 45 57.03	1518.1 1232.3
Channel, 1851.....	46 13 13.49 123 37 12.66	416.5 271.3	Sauvies Island, 1878.....	45 49 55.56 122 47 45.59	1715.4 982.2
Cliff Point, 1851.....	46 15 47.00 123 50 19.46	1451.1 416.7	Henricl, 1878.....	45 48 43.49 122 47 50.91	1342.7 1099.1
Cross, priest's house, 1851.....	46 14 45.66 123 54 17.67	1409.7 378.5	Lancaster, 1878.....	45 51 15.36 122 45 59.89	474.2 1292.2
Lewis and Clark River, 1851.....	46 09 31.97 123 51 42.60	987.1 902.3	Sandy Beach, 1878.....	45 47 24.63 122 46 30.44	760.4 657.6
Marsh Point 1, 1851.....	46 09 54.00 123 52 36.91	1667.2 791.8	Wikman, 1878.....	45 47 12.26 122 47 11.58	378.5 250.1
Marsh Point 2, 1851.....	46 13 43.88 123 34 23.09	1354.8 494.8	Willows, 1878.....	45 58 49.46 122 50 44.68	1527.1 959.6
Pillar Hill tree, 1851.....	46 16 05.73 123 34 17.52	176.9 375.1	Round Point, 1878.....	45 48 47.50 122 47 04.51	1466.5 97.4
Rock Knoll, 1851.....	46 16 03.89 123 40 06.10	120.1 130.6	Martins Island, 1878.....	45 56 10.00 122 47 58.41	308.7 1258.4
Skeppernawin Creek, 1851.....	46 10 26.22 123 54 30.68	809.5 688.2	Barn, north gable, 1881.....	45 41 15.36 122 41 51.40	474.2 1112.3
Upper Astoria, 1851.....	46 11 34.87 123 48 08.06	1076.6 172.8	Beacon, 1881.....	45 38 32.01 122 46 31.80	988.3 688.6
Youngs River, 1851.....	46 09 50.59 123 50 00.17	1562.0 3.7	Cupola, Vancouver, 1881.....	45 37 47.38 122 40 02.06	1462.8 44.6
Westerly of two trees, 1872.....	46 16 33.11 123 21 15.68	1022.3 335.7	Dann, 1881.....	45 49 16.32 122 50 53.57	503.9 1186.5
Dead tree, 1872.....	46 09 45.76 123 25 57.94	1412.8 1243.0	Dann's house, north gable, 1881.....	45 49 13.21 122 50 51.14	407.9 1104.0
Kalama astronomic, 1872.....	46 00 25.78 122 50 26.44	795.9 569.0	Dillion's house, north gable, 1881.....	45 40 11.54 122 45 35.10	356.3 759.8
Kalama azimuth, 1872.....	46 00 24.61 122 50 36.97	759.8 795.5	Shobert chimney, 1881.....	45 49 16.32 122 44 33.82	503.9 730.2
Ahles, 1878.....	45 59 49.03 122 50 30.91	1513.8 665.1	Stewart's house, south gable, 1881.....	45 47 50.09 122 51 51.59	1546.5 1114.1
Bachelors Island, 1878.....	45 49 42.57 122 47 08.96	1314.3 193.4	Tree on Rocky Butte, 1881.....	45 32 47.28 122 33 53.93	1459.6 1169.8

DESCRIPTION OF STATIONS.

This list may be conveniently consulted by reference to the illustrations at the end of this publication or to the index. All azimuths given in the descriptions are reckoned continuously from true south around by west to 360°, south being 0°, west 90°, north 180°, and east 270°. Where magnetic azimuths are given they are indicated as such.

In general, except where the contrary is specifically stated, the surface and underground mark are not in contact, so that a disturbance of the surface mark will not necessarily affect the underground mark. The underground mark should be resorted to only in cases where there is evidence that the surface mark has been disturbed.

The initials and dates given in each description immediately after the county refer to the date of the establishment of the station, the man by whom it was established, and the date when the station was last recovered.

Any person who finds that one of the stations herein described has been disturbed, or that the description no longer fits the facts, is requested to send such information to the Superintendent, Coast and Geodetic Survey, Washington, D. C.

MARKING OF STATIONS.

The standard disk station and reference marks referred to in the following descriptions and notes consist of a disk and shank of brass cast in one piece, as shown in illustration No. 3. The disk of the station mark is 90 mm. in diameter, with a hole at the center surrounded by a 20 mm. equilateral triangle, and has the following inscribed legend: "U. S. Coast and Geodetic Survey Triangulation Station. For information write to the Superintendent, Washington, D. C. \$250 fine or imprisonment for disturbing this mark." The shank is 25 mm. in diameter and 80 mm. long, with a slit at the lower end into which a wedge is inserted so that when it is driven into a drill hole in the rock it will bulge at the bottom and hold the mark firmly in place.

The standard disk reference mark, shown in illustration No. 3, is the same size and shape as the station mark, with an arrow on the top in place of the triangle, which, when properly set, points to the station. The legend is the same, except the words "reference mark" take the place of the words "triangulation station."

The type of station mark approved by the Chief of Engineers, United States Army, for re-marking stations originally established by that service is the same as the standard disk station mark, with the addition of a fourth and inner circle of lettering to the legend. This addition is "Estab'd by Corps of Engineers, U. S. A."

GENERAL NOTES REGARDING THE MARKING OF STATIONS.

Note 1.—This station is marked by an iron pipe 3 feet long set in a pier of concrete which is about 1 foot square at the surface of the ground and approximately 8 inches deep. The pipe projects from 4 to 8 inches above the cement. The top of the pier bears the inscription "U. S. E." and the name or an abbreviation of the name of the station. There is no underground mark.

Note 2.—This station is marked by a standard disk station mark set in an irregular pier of concrete, the top of which is spherical in shape and projects from 6 to 8 inches above the surface of the ground. The underground mark is a glass bottle set neck down in concrete from 2½ to 3 feet below the surface.

Note 3.—The geographic positions of the permanent reference marks at this station have been computed and may be found in the list of geographic positions immediately following the position of the station, consequently the distances and azimuths have not been repeated in the descriptions.

Note 4.—The same as note 1 with the addition that the iron pipe is filled with sand to the bottom of the concrete, and then with concrete to the top of the pipe, and a standard disk station mark of the type approved by the Chief of Engineers, United States Army, is set in the cement on the inside of the pipe.

Note 5.—The same as note 2 except that the standard disk station mark is replaced by a standard disk reference mark, and there is no underground mark.

Note 6.—The station is marked by a standard disk station mark set in an irregular pier of concrete, projecting from 6 to 8 inches above the surface of the ground. An iron pipe extends downward from under the station mark to a point just over the underground mark. The underground mark is a bottle set neck down in concrete 2½ or 3 feet below the surface.

Note 7.—The same as note 6 except that a standard disk reference mark replaces the station mark.

Note 8.—The station is marked by a bottle buried mouth up 3 feet below the surface and at the surface there is a rock with a drill hole filled with lead. Around the station, buried 1 foot, are three bottles distant about 6 feet, at equal angles, and lying on their sides with the necks pointing to the station.

Note 9.—The station is marked about 2½ feet underground by a bottle and at the surface by a drill hole, filled with lead, in a stone block. Three stakes around the station bear north, south, and east magnetic and are distant 0.91 meter.

Note 10.—The station is marked by a drill hole in a stone set firmly in the ground. Two stakes were set in line one on either side of the station, and a third stake was set at right angles to this line, each distant 1.22 meters.

Note 11.—The station is marked from 12 to 15 inches below the ground by a drill hole in a rock and at the surface by a standard disk station mark set in a rock. The reference marks are three-eighths-inch brass bolts set in a stone level with its surface.

Note 12.—The station is marked by a standard disk station mark cemented into a drill hole in an irregular shaped rock firmly set in place. The top of the stone is about 3 inches above the surface of the ground.

Note 13.—The station is marked by a bottle set 3 feet below the surface, and at the surface by a standard disk station mark set in a cylindrical bed of concrete 8 inches in diameter by 2 feet deep. There is a standard disk reference mark set in concrete.

Note 14.—The station is marked by a concrete block 10 inches square and 1½ feet deep with a 1½-inch iron pipe run through the center.

Note 15.—The station is marked by a bottle buried 3 feet below the surface, and at the surface there are three stubs with a copper tack in the top of each, distant 3 feet and bearing north, south, and east (magnetic).

Note 16.—Stations with a reference to this note were established by the United States Engineers and are marked in a temporary manner, usually by tacks or nails driven in wharves. There is no description for them available.

Note 17.—The station is marked by a pipe set in the center of a square block of concrete. The top of the concrete is smoothed off and bears the letters U. S. E., one letter in each of three corners. In the fourth corner is the number, letter, or name by which the station is known.

MOUTH OF THE COLUMBIA RIVER TO PORTLAND.

PRINCIPAL POINTS.

Scarboro Hill 2 (Pacific County, Wash., J. J. G., 1873; 1913). On the highest part of the hill entirely clear of timber and about 15 meters from the highest point on a line to Fort Stevens. The station is marked by a one-half-inch drill hole 2 inches deep in a stone buried 1 foot below the surface. South of the station 45 meters is a spruce tree 2 feet in diameter, marked with a blaze and three nails in the form of a triangle, north 29 meters is a spruce tree 20 inches in diameter with a similar marking, and west 53 meters is an alder tree 20 inches in diameter with the same marking.

East Battery (Pacific County, Wash., E. H. P., 1911; 1913). On the embankment of the old east battery at Forth Canby, on the brow of a steep slope which rises from the water at the easternmost point, abreast of Sand Island, 50 meters up the hill from the building on the slope, and 4 miles by road or 2 miles by water from Ilwaco, marked with a standard disk station mark set in the top of a square granite post, flush with the top of the ground. Reference mark No. 1 is a 3-inch iron bolt embedded in masonry about 1 foot above the level of the road, distant 9.42 meters in azimuth 45° 23', reference mark No. 2 is the same as above and is distant 4.71 meters in azimuth 63° 09', reference mark No. 3 is the same and is distant 6.54 meters in azimuth 120° 25', reference mark No. 4 is the easternmost corner of cement manhole about 3 meters outside the embankment, distant 4.89 meters in azimuth 223° 09'.

Battery (Pacific County, Wash., J. J. G., 1873; 1909). The station is marked 1 foot below the surface by a one-half inch drill hole 2 inches deep in the top of a large stone. The station could not be recovered in 1911.

Fort Stevens Longitude (Clatsop County, C. V. H., 1911; 1913). On the embankment at the edge of the old moat, just in front of Battery Freeman at Fort Stevens. The station is marked by a standard disk station mark bearing the usual inscription and the words "Astronomical Station," set in the middle of the notch in the top of the pier. The foundation of the pier was placed 4 feet in the ground, the lower 2 feet being old concrete blocks tamped in with sand, the remainder is concrete. *Gun* is distant 27.90 meters in azimuth 45° 18' 20''. Reference mark No. 1 is a cross one-half inch deep in the concrete embankment in front of the easternmost and smallest cannon in Battery Freeman and about 8 inches from the inner edge of the concrete, distant 37.25 meters S. 27° 30' E. (magnetic). Reference mark No. 2 is a small triangle with a three-fourths inch hole in the center, cut in the concrete directly in front of the easternmost of the two 6-inch guns about 8 inches from the inner edge of the concrete, distant 42.20 meters S. 40° 00' W. (magnetic.)

Island (U. S. E.) (Pacific County, Wash., E. B. L., 1913). On the southeast end of Sand Island, marked according to note 1.¹ The reference mark is a standard disk reference mark set in an irregular pier of concrete projecting 6 inches above the ground, distant 51.22 meters in azimuth 44° 03' 12''.

Tansy Point 2 (Clatsop County, J. J. G., 1873). The station is marked 1 foot below the surface by a block of wood 1 foot square by 8 inches deep, with a one-half inch drill hole 2 inches deep in the top. On the surface there are three stubs, two parallel with the shore and one at right angles, each distant 1.83 meters.

Smith Point (Clatsop County, R. D. C., 1851; 1873). On Youngs Point, about 4.5 meters from the high-water mark and 5 feet above the tide. The station is marked by cross lines on a flat stone. There are three stakes around the station, each distant 1.83 meters.

¹ See p. 81.

Scarboro Hill (Pacific County, Wash., R. D. C., 1851; 1873). On the south side of Scarboro Hill, about one-half mile south of Chinook Point, and about 2 meters north of a remarkable ledge of rock cropping out of the side hill. The station is marked according to note 8,¹ except there is no surface mark.

Tansy Point (Clatsop County, R. D. C., 1851).—Lost.

Point Adams (Clatsop County, R. D. C., 1851). About one-half mile east of the extremity of Point Adams, on the edge of the bank 12 feet above the high-water mark. The station is marked according to note 8,¹ except there is no surface mark.

Cape Disappointment (Pacific County, Wash., R. D. C., 1851). On the side hill on the most eastern spur of Cape Disappointment. The station is marked by a stake driven 3 feet in the broken rock; around this are three other stakes, each distant 1.83 meters.

Baker east base (Pacific County, Wash., R. D. C., 1851). On Bakers Bay about 365 meters west of the mouth of the Chinook River, on a small sand hill about 10 feet above the ordinary high-water mark. The station is marked 3 feet below the surface by a copper bolt set in a sandstone block 10 inches square by 18 inches long; over this is a wood block 2 feet in diameter and 2½ feet long. Three stakes set around the station are distant 1.83 meters.

Baker west base (Pacific County, Wash., R. D. C., 1851). On Bakers Bay, 365 meters east of the mouth of the Wallicut River, about midway between the alder bushes and the high-water mark. The station is marked by a copper bolt in a sandstone block 10 inches square and 18 inches long set 3 feet below the surface; over this is a block of wood 2 feet in diameter and 2½ feet long. Three stakes were set, each distant 1.83 meters.

Point Elllice (Pacific County, Wash., R. D. C., 1851). On Point Elllice 25 feet above the tide. The bank was cut away and leveled to make room to occupy the station. The station is marked by a cross cut on a large flat rock. There are three stakes around the station, two distant 1.83 meters, and the other is north 1.22 meters.

Astor Point (Clatsop County, R. D. C., 1851). On Astor Point about 2 meters from the edge of the river and 7 feet above the high-water mark. The station is marked by a cross on a flat stone 3 feet below the surface. There are three stakes around the station, each 1.83 meters distant.

Grays Point (Pacific County, Wash., R. D. C., 1851). On the river bank about midway of Grays Point and 10 feet above the highest tide. The station is marked by a bottle buried 3 feet below the surface. There are 3 stubs with a copper tack in the top, each distant 1.83 meters.

Tongue Point (Clatsop County, R. D. C., 1851).—Lost.

Rocky Point (Wahkiakum County, Wash., R. D. C., 1851).—Lost.

Indian Point (Clatsop County, R. D. C., 1852). On Indian Point on a side hill about 20 feet above the tide, in front of an almost perpendicular cliff. The station is marked according to note 8,¹ except there is no surface mark.

Cathlamet Point (Clatsop County, R. D. C., 1851; 1871). On a side hill on the west side of Cathlamet Point, about 190 feet above tidewater. The station is marked by a bottle buried 3 feet below the surface. There are 3 stubs with copper tacks in the top of each, distant 1.83 meters from the station.

Jim Crow Point (Wahkiakum County, Wash., R. D. C., 1851; 1913). On the north side of the Columbia River, on Jim Crow Point, and about 1,800 meters to the east of Pillar Rock, and about 35 feet above the tide. The station is marked according to note 2,¹ with the exception that the underground mark is a stone, with a cross cut in its surface, buried 3 feet below the surface. See also the description of *Jim Crow Point* (*U. S. E.*).

Three Tree Point (Wahkiakum County, Wash., R. D. C., 1851; 1913). On the north side of the Columbia River, on Three Tree Point, about 35 feet above tidewater. The station is marked according to note 2,¹ except that the underground mark is a cross cut on a flat stone instead of a bottle. See description of *Three Tree Point* (*U. S. E.*).

Aldrich (Clatsop County, C. R., 1871). On the eastern end of a small sharp ridge on the northeast side of Cathlamet Point, 233 feet above tidewater. The station is marked according to note 8.¹ Three stakes were set as follows, north 1.46 meters, east 1.89 meters, and south 1.83 meters. There is a copper tack in a stump, distant 3.20 meters.

Skumaquea (Wahkiakum County, Wash., C. R., 1871). On a high ridge nearly destitute of trees and covered with ferns, 342 feet above the tide. The station is marked according to note 8.¹

Quinn (Clatsop County, C. R., 1871). On the side of the first point above Aldrich's fishery, opposite the lower part of Tenasillihee Island, near the shore, west of a deep ravine, and 153 feet above the river. The station is marked according to note 8.¹ Three stakes were set in the ground, north, south, and east, respectively, each distant 1.83 meters.

Lokamin (Wahkiakum County, Wash., C. R., 1871). On the end of the most prominent projecting ridge between Skumaquea and Cathlamet. The station is marked according to note 8.¹ Three stakes around the station are distant 1.83 meters, bearing magnetic, respectively, north, south, and east.

Hunts Mill Point (Clatsop County, C. R., 1871). On the apex of a ridge of basaltic rock which is nearly perpendicular on the river side. The station is marked according to note 8.¹ There are three stakes around the station, distant 1.83 meters and bearing magnetic east, west, and south.

Birnie (Wahkiakum County, Wash., C. R., 1871). On the cleared land near the edge of the timber, about 275 meters southeast of the Birnie house, just south of a road and 156 feet above the river. The station is marked according to note 8.¹ Three stakes bearing north, south, and east are distant 1.83 meters.

Westport (Clatsop County, C. R., 1871). On a sharp ridge projecting into the bottom lands, 600 meters from the wharf and 292 feet above the level of the river. The station is marked according to note 8,¹ except the surface mark was omitted. Three stakes around the station are distant 1.83 meters, bearing, respectively, north, south, and east.

¹ See pp. 81 and 82.

Anderson (Wahkiakum County, Wash., C. R., 1872). About 3½ miles above Cathlamet, on a rocky side hill covered with heavy timber and brush, nearly opposite the head of Puget Island, and about 150 feet above the level of the river and about 3 meters east of an old burnt stump. The station is marked according to note 9,¹ except the surface mark is omitted and the three stakes are each 1.83 meters distant.

Woods (Columbia County, C. R., 1873). About 4½ miles above Westport, up the Westport Slough, on the apex of a sharp ridge on land owned by Mr. Woods. The station is marked according to note 8,¹ except the surface mark is a piece of the original signal pole.

Cape Horn (Wahkiakum County, Wash., C. R., 1873).—Just back of a large rock on a point locally known as Cape Horn. The station is marked according to note 8,¹ except there is no surface mark. There are 2 stubs and a stump of a tree with copper tacks in them, distant 1.83 meters from the station.

Clatskanie (Columbia County, C. R., 1873).—On a sharp ridge opposite the head of Westport Slough where it branches off from Beaver Slough, 227 feet above the river level. The locality can be located by the lines of stumps left by the cutting which was done to open lines of sight. The station is marked according to note 8,¹ except the surface mark is a part of the center pole of the original signal.

Cooper (Wahkiakum County, Wash., C. R., 1873). On the north side of the Columbia River on a sharp ridge above a rocky point, 91 feet above the river. The station is marked according to note 8,¹ except the surface mark is a section of the original center pole of the signal. Three stakes were set bearing north, south, and east magnetic distant 1.83 meters.

Bradbury (Columbia County, C. R., 1873). On land owned by Mr. Bradbury about 150 meters from the prairie, 80 meters from the edge of a clearing, 71 feet above the level of the river. The station is marked according to note 8,¹ except the surface mark is a section of the old center pole of the signal. Three stakes bear north, south, and east magnetic distant 1.83 meters.

Abernathy (Cowlitz County, Wash., C. R., 1873). On the summit of the high perpendicular basaltic cliffs, about 15 meters from the edge, and 291 feet above the river level, and just east of the first break in the cliff below Oak Point Creek. The station is marked according to note 8,¹ except there is no surface mark. Three stakes around the station bear north, south, and east magnetic distant 1.83 meters.

Nequally (Cowlitz County, Wash., C. R., 1873). About one-half mile below the mouth of the Nequally Creek, on the brink of a precipice of basaltic rock, 268 feet above the level of the river. The station is marked according to note 8,¹ except the surface mark is a section of the center pole of the old signal. Three stakes bear north, south, and east magnetic distant 1.83 meters.

Stoughton (Columbia County, C. R., 1873). About 1½ miles above Oak Point on what is called Bradburys Slough, in a small garden 3 or 4 feet above high water, and 30 meters from the shore and 80 meters east of the house. The station is marked according to note 8,¹ except the surface mark is a section of the center pole of the old signal. Three stakes bear north, south, and east magnetic distant 1.83 meters.

Greens Point (Columbia County, C. R., 1873; 1885). On a bold, rocky point about 4 miles above Oak Point and about 75 feet above tidewater. The station is marked according to note 8,¹ except the surface mark is a piece of pine 4 inches square. There is a pine stub east and one south of the station 1.83 meters.

Coal Creek Ridge (Cowlitz County, Wash., A. W. C., 1873). On the edge of a prominent ridge about one-half mile west of Coal Creek; the numerous stumps left from the heavy cutting will serve to identify the locality. The station is marked according to note 8.¹

Mount Solo (Cowlitz County, Wash., C. R., 1873). On a narrow ridge of land on the western side of Mount Solo. The locality can probably be found by the heavy cutting which was done to open lines of sight. The station is marked according to note 8,¹ except the surface mark is a section of the center pole of the signal. Three stakes around the station have the following magnetic bearings and distances: North 1.83 meters, south 1.83 meters, and west 1.87 meters.

Rinearson (Columbia County, C. R., 1873; 1913). On the summit of a very sharp pointed hill, over the east one of two tunnels, west of camp No. 1, Peninsula Lumber Co. The station is marked according to note 2,¹ except that a small hole in the concrete replaces the bottle in the underground mark.

Huntington (Cowlitz County, Wash., C. R., 1873; 1913). About 2 miles west of Kelso, on the western side of a large, isolated boulder. The station is marked by a standard disk station mark set in lime mortar. The underground mark is a flat stone with a cross cut on it buried 2 feet below the surface. Three bottles were placed on their sides with the necks pointing to the station and buried 1 foot. There is a triangular blaze on the side of an oak tree facing the station distant 3.82 meters and a similar mark on a spruce tree distant 15.70 meters.

Rainier (Columbia County, C. R., 1873). Near the village of Rainier, on a side hill about 200 meters from the shore and down the hill about 45 meters from an old logging road. The station is marked according to note 8,¹ except that the surface mark is a post 2½ feet long with a copper tack in the top. There is a blazed fir tree stump bearing 206° magnetic distant 3.64 meters and a blazed fir tree bearing 37° magnetic distant 2.59 meters.

Coweman (Cowlitz County, Wash., C. R., 1873).—Nearly opposite the mouth of the Coweman Creek, on top of a small ridge, back of which the ground falls before rising to the hills, about 60 meters from the lowlands, and 167 feet above the river. The station is marked according to note 8,¹ except the surface mark is a section of the old center pole of the signal. Two stakes were set, one east and one west of the station.

Mount Coffin (Cowlitz County, Wash., C. R., 1873; 1913). On the summit of a rock called Mount Coffin, about 4.5 meters from the northern edge of the rock, which is nearly vertical on that side, and 227 feet above tidewater. The

¹ See pp. 81 and 82.

station is marked by a drill hole filled with lead in a rock level with the surface of the ground. The reference mark is described in note 5.¹ There is a triangular blaze on an oak tree distant 23.3 meters in azimuth $90^{\circ} 25'$, and a similar blaze on a large spruce tree distant 9.83 meters in azimuth $110^{\circ} 46'$. See note 3.¹

Warren (Columbia County, C. R., 1873). About 1 mile above Rainier, on top of a steep bluff about 100 meters from the river and 142 feet above tidewater. The station is marked according to note 8,¹ except there is no surface mark. Three stakes were set with the following magnetic bearings and distances: North 1.83 meters, east 1.80 meters, and south 1.83 meters.

Carolls Point (Cowlitz County, Wash., C. R., 1873). On top of an isolated ridge exactly opposite the head of Cottonwood Island. The station is marked according to note 8,¹ except there is no surface mark.

Galloway (Columbia County, C. R., 1873). Opposite the upper part of Cottonwood Island, 6 or 7 meters from the edge of the precipice, almost immediately over the water. The station is marked according to note 8,¹ except the center mark is a section of the center pole of the old signal. Three stakes were set bearing magnetic north, south, and east distant 1.83 meters.

Carr (Columbia County, C. R., 1873; 1913). About one-half mile up the river from Prescott, on a rocky point approximately 50 feet above low water. The station is marked by a stone sunk in the ground, the top being flush with the surface. There is a hole drilled in the stone, filled with lead and marked with cross lines. The reference mark is according to note 5.¹ There is a blaze with copper tacks on a fir tree distant 35 meters in azimuth $34^{\circ} 07' 36''$. See note 3.¹

Drays Mound (Cowlitz County, Wash., C. R., 1873; 1913). About $2\frac{1}{2}$ miles northwesterly from Kalama, near the tracks of the Northern Pacific Railway and on the southern end and highest part of Drays Mound. The station is marked according to note 2,¹ with the exception that the underground mark is an iron nail set in cement in a hole drilled in the rock; also 1 foot below the ground there are two bottles on their side and with the necks pointing to the station. The reference mark is a galvanized-iron pipe filled with earth and cement, and set in concrete, with a copper tack in its top surface. There is a triangle on a fir tree distant 6.43 meters in azimuth 120° magnetic. See note 3.¹

Gobles Point (Columbia County, C. R., 1873). About 1 mile below Kalama on broken rocky ground, about 100 meters from the shore. The station is marked according to note 8,¹ except the surface mark is a post $2\frac{1}{2}$ feet long, with a copper tack to mark the station.

Rocky Ridge (Cowlitz County, Wash., C. R., 1878). On a rocky ridge about 180 meters from the shore back of a small log cabin. On the north side of the ridge is a heavily wooded swamp. The station is marked according to note 8.¹ There is a triangular blaze on a small fir stump bearing N. 85° E. magnetic, distant 10.13 meters, and a fir tree with a similar mark bears S. 80° E. magnetic, distant 15.12 meters.

Hunter (Columbia County, C. R., 1873). Nearly opposite Kalama, on firm bottom land 25 meters from the shore, 75 meters from an orchard back of the station, 120 meters north of a house, and 225 meters north of a creek. The station is marked according to note 8,¹ except the surface mark is a section of the center pole of the original signal. Three stakes bear magnetic north, south, and east distant 1.83 meters.

Hoffman (Cowlitz County, Wash., C. R., 1878). About 3 miles above Kalama, 1 mile below Martins Bluff, 180 meters above Mr. Hoffman's house, and 75 feet above the level of the river, and 12 or 14 meters from the edge of the bank. The station is marked underground by a drill hole in a rock filled with lead. There are three wild cherry stakes set as follows: North 1.83 meters, south 1.87 meters, and east 1.81 meters.

Martins Bluff (Cowlitz County, Wash., C. R., 1878; 1913). The station is 4 meters from the edge of the summit of Martins Bluff, approximately 75 feet above low water. The station is marked by a copper bolt in rock. The reference mark is the same as is described in note 7,¹ except no underground mark. There is a triangle blazed on the only large fir tree in the vicinity distant 22.98 meters in azimuth $291^{\circ} 59'$. See note 3.¹

Merrill (Columbia County, C. R., 1878). On the nose of a high ridge on the farm belonging to Mr. Norton Merrill and southwest of the bridge across Tide Creek. The station is marked by a drill hole filled with lead in a large conical rock. Three cedar stakes were set as follows: North 1.79 meters, south 1.83 meters, and east 1.86 meters. Three copper tacks in a triangular blaze on a white fir tree bear S. 73° W., magnetic, distant 9.769 meters.

Burnt Hill (Cowlitz County, Wash., C. R., 1878). On the crest of a burnt ridge covered with scrub oak and hazel, with a few trees in the vicinity. The station is marked according to note 8,¹ except the three bottles pointing to the station are omitted. There are three cedar stakes around the station, as follows: North 1.74 meters, south and east each 1.79 meters.

Maple Hill (Columbia County, C. R., 1878). About $1\frac{1}{2}$ miles below Columbia City, nearly opposite the head of Deer Island, on the summit of a wooded hill about 460 feet above the river level. The station is marked $2\frac{1}{2}$ feet underground by a drill hole filled with lead in a flat-topped stone, and at the surface by a similar mark in a stone projecting 6 inches above the surface. Three cedar stakes were set as follows: North 1.79 meters, south and east each 1.83 meters. There are three copper tacks in a triangular blaze on a fir tree bearing S. 15° W. magnetic, distant 2.35 meters.

Lewis River Hills (Clarke County, Wash., C. R., 1878). On a narrow bench on one of the most prominent ridges on the southwest face of the hills lying between the two forks of the Lewis River. The station is marked according to note 8.¹ Three cedar stubbs are set as follows: North 1.81 meters, east 1.83 meters, and south 1.86 meters. Three copper tacks in a blaze on a burnt stump bear S. 6° E. magnetic, distant 3.472 meters.

¹ See pp. 81 and 82.

Reed (Clarke County, Wash., C. R., 1878). About 135 meters northwest of the top of the hill on the land owned by Mr. S. G. Reed. The station is marked according to note 8.¹ Three stakes are set around the station as follows: North 1.83 meters, east 1.84 meters, and south 1.85 meters.

Table Cliff (Columbia County, C. R., 1878). On a bare flat table cliff of rock about midway between Columbia City and St. Helens, about one-half mile from the river shore, and 275 meters from the county road from St. Helens to Portland, and about 200 feet above the river level, northeast of a small gulch, and about 27 meters southeast of a small pond in the rainy season. The station is marked by a drill hole filled with lead in solid rock.

Scappoose (Columbia County, C. R., 1878; 1881). On the end of the high ridge between the north and south forks of the Scappoose Creek, and west of the county road between St. Helens and Portland, about 460 feet above the river. The station is marked according to note 8.¹ There are three cedar stumps around the station, as follows: East 1.92 meters, north 1.84 meters, and south 1.84 meters. Three copper tacks in a triangular blaze on a large fir stump bears S. 80° E. magnetic, distant 6.91 meters, and a similar mark on a large fir tree bears S. 12° E. magnetic, distant 5.34 meters.

Fales (Clarke County, Wash., C. R., 1878; 1881). In a cleared field on high ground on the east side of Lake River. The station is marked according to note 8.¹ Three cedar stakes are set as follows: North 1.79 meters, south 1.86 meters, and east 1.80 meters.

Secrist (Clarke County, Wash., C. R., 1881). On the north side of Vancouver Lake just back of Secrist Landing, on a bare hillside about 100 feet above the lake, 50 meters east of an old log house, and close to a fence which is parallel with the shore. The station is marked according to note 8,¹ except the underground mark is the intersection of cross lines on a flat stone. Three cedar stakes were set as follows: North 1.73 meters, south 1.84 meters, and east 1.81 meters.

Bouser (Multnomah County, C. R., 1878; 1881). On the west side of Willamette Slough, about 1 mile below Rocky Point, on the northeast end of a partly bare spur southwest of the Bouser farmhouse, and 515 feet above the water level. The station is marked according to note 8.¹ Three cedar stakes were set as follows: North 1.86 meters, east and south each 1.83 meters. Two fir trees have copper tacks in a triangular blaze; one bears S. 18° W. magnetic distant 8.50 meters and the other bears S. 55° W. magnetic distant 3.615 meters.

Willamet (Multnomah County, C. R., 1881). On the nose of a high hill on the west bank of the Willamette River, about 1 mile south of the head of Willamette Slough, on a level spot which can probably be easily found from the heavy cutting done to open lines of sight. The station is marked according to note 8.¹ There are three cedar stumps around the station, as follows: North 1.80 meters, east 1.79 meters, and south 1.78 meters. A triangular blaze on a fir stump bears N. 61° E. magnetic distant 5.03 meters, and a second similar mark bears N. 26° W. magnetic distant 5.67 meters.

Warren (Columbia County, O. B. F., 1903). About a mile southwest of Warren, a station on the Northern Pacific Railway, on a slight elevation or ridge near the west side of a pasture owned by Mr. E. Harnes, and about 250 meters north of an east-and-west road. The station is marked by a three-eighths inch copper bolt 3 inches long, cemented into a drill hole in a stone 6 by 12 by 18 inches, buried 18 inches below the ground. The surface mark is the old-style station mark, which is a disk and shank cast in one piece. The disk is about 85 millimeters in diameter and has a polished center surrounded by the raised letters "U. S. C. & G. S." and a raised flange around the edge. This mark is set at the surface of the ground in a boulder 8 by 24 by 24 inches, with the letters "U. S." cut on the north side. There are three reference marks, which are drill holes in the top of three-eighths inch copper bolts, which are leaded or cemented into drill holes in rock with the top of the bolt flush with the surface. The three reference marks are in the north-and-south fence line to the west of the station. The middle mark of the three is 246.7 meters north of the north road fence and the other two are each about 30 meters distant from the middle mark, one north and the other south. They are at the following distances and azimuths from the station: 23.67 meters, 93° 15'; 37.46 meters, 41° 26'; and 37.95 meters, 142° 46'.

Rocky Butte (Multnomah County, C. R., 1889; 1903). On the north side of the highest part of the bush-covered summit of the butte, about 2 miles northeast of Montavilla. The station is marked by a drill hole in a large-topped boulder.

Harney (Clarke County, Wash., C. R., 1881; 1903). On the north bank of the Columbia River, about 1½ miles above the United States wharf at Vancouver, on a sloping bare bluff immediately above the road leading from Vancouver up the river. It is almost in front of the Harney House, on land formerly owned by Gen. Harney, and about 80 meters east of the fence inclosing the race track. The underground mark consists of a glass bottle placed 3 feet below the surface, with the neck up, the center of the neck marking the station, and three other bottles placed on their sides at a depth of about 1 foot and at a distance of about 6 feet from the center, with the necks of the bottles pointing toward the center. The surface mark is a small drill hole 2 inches deep in a basaltic boulder, weighing about 350 pounds, placed with its top flush with the surface of the ground. The following bearings to the right of the magnetic north were read at the station: East chimney of Harney House, 27° 05'; triangle on tree, 74° 28'; white house on south side of river, 172° 55'; ventilator on barn, 220° 06'; and corner of race-track fence, 276° 47'.

Barnes (Multnomah County, O. B. F., 1903). On a cleared hill about 4 miles west of Portland, between the Barnes and Cornell roads, and just east of the highest hill in this range, which hill is still densely wooded. It is on the south edge of the hill, about 100 feet southeast of a fir tree and some small maples, and close to the north side of a large stump.

¹ See pp. 81 and 82.

The station is marked by a three-eighths inch copper bolt 3 inches long, cemented into a drill hole in a stone 6 by 12 by 18 inches, 1½ feet below the surface. The surface mark is an old-style station mark, which is a disk and shank cast in one piece. The disk is about 85 millimeters in diameter and has a polished center surrounded by the raised letters "U. S. C. & G. S." and a raised flange around the edge. This is set in a stone 8 by 14 by 18 inches, with its top flush with the surface of the ground. The two reference marks are drill holes in the top of three-eighths inch copper bolts, which are leaded or cemented into drill holes in rock with the top of the bolt flush with the surface. These are set at the roots of stumps on the side facing the station and are located as follows: One in a boulder 15 inches in diameter, distant 15.80 meters from the station in azimuth 156° 11'; and the other in a boulder 12 inches in diameter, 7.02 meters from the station in azimuth 233° 23'. A third reference mark consists of a cross in the top of a boulder 10 inches in diameter buried 15 inches beneath the surface, and of a copper bolt directly above the cross in a boulder 14 by 14 by 18 inches, set with its top flush with the surface of the ground. It is about 3 feet north of the main east-and-west fence line, about 30 feet east of where this fence crosses the highest part of the ridge, and about 3 feet east of a fence extending northward from this fence, and 44.95 meters from the station in azimuth 184° 35'.

Monument, General Land Survey (Multnomah County, O. B. F., 1903). The initial intersection of the first standard parallel and the Willamette meridian, a short distance southeast of Barnes. (See above.) The station is in a fence corner, and is marked by a stone post projecting 1½ feet above the ground.

River (Multnomah County, O. B. F., 1903). Near the junction of the two suburbs of Portland known as Arbor Lodge and Peninsula, on the east bank of the Willamette River about a mile east of Columbia University. It is on a slight elevation, the highest in the vicinity, and in the fence line on the north side of the boulevard along the river bank. It was placed as far east as possible and still keep the Oregonian Building in view. The station is marked by crosses cut in the tops of two boulders, one placed near the surface of the ground and the other directly beneath at a depth of 1.7 feet, each stone bearing the letters "U. S. C. S." cut in the top.

Oregonian (Multnomah County, O. B. F., 1903). The tall iron pole at the southeast corner of the tower of the Oregonian Building, at the northwest corner of Sixth and Adler Streets, Portland.

Portland longitude station (Multnomah County, C. H. S., 1887; 1905). This station has been destroyed.

Portland latitude station (Multnomah County, C. H. S., 1887; 1905). This station has been destroyed.

Balch (Multnomah County, C. R., 1881; 1906). This station was occupied for azimuth in 1886. It is immediately northwest of the city limits of Portland, about a mile south of the Willamette River, on the first small level bench of the spur making out from the ridge west of the Cornell road, and about 255 feet above the road. The station is marked underground by a broken-necked bottle placed neck up 2 feet below the surface, and by a cross in the top of a copper bolt set in concrete 6 inches above the bottle, and at the surface by a cross on an old-type station mark set in concrete, which is inscribed with the letters "C. & G. S." The old-type station mark consists of a disk and shank made of brass and cast in one piece. The disk is about 85 mm. in diameter and has a polished center surrounded by the raised letters "U. S. C. & G. S." and a raised flange around the edge. The reference marks are the remains of two brick piers built in line to the west of the station, with their foundation about 20 inches below the surface, the nearest edge of the first pier being 1 meter west of the station.

Sands (Clatsop County, E. B. L., 1913). On the highest part of the sand spit near the middle of the river and 2½ miles northwest from Smith Point. The station is marked according to note 2. A pile marked with nails is distant 103.9 meters in azimuth 172° 18' 40''.

Point Ellice (U. S. E.) (Pacific County, Wash., U. S. E., 1913). On Point Ellice between the river bank and the tracks of the Oregon-Washington Railroad & Navigation Co., and 25 feet above the low-water mark. There is a large boulder within 1 meter of the station. The station is marked according to note 1.¹ Reference mark No. 1 is a cross cut in rock, the longer arm pointing toward the station. Reference mark No. 2 is a standard disk reference mark set in a block of concrete. See note 3.¹

Harrington (U. S. E.) (Wahkiakum County, U. S. E., 1913). Located one-half mile west of Altoona Cannery, 12 meters from the edge of the bluff, and approximately 20 feet above the mean stage of the river. There is a sharp break in the bluff line 7 meters from the station on a line to Altoona Cannery. The station is marked according to note 1.¹ The reference mark is a hole bored in a boulder on the shore.

Taylor (Clatsop County, E. B. L., 1913). On a fishing wharf on Taylor Sands. Marked with a triangle of copper tacks with one tack in the center.

Grays (U. S. E.) (Pacific County, Wash., U. S. E., 1913). One mile east of Knapton, one-half mile west of Gray's Point, 6 meters from the edge of the bluff, and 20 feet above the river at mean stage. The station is marked according to note 1.¹ There is a triangle blazed on a leaning spruce tree near the edge of the bluff, distant 11.6 meters in azimuth 51° 48', a second spruce tree distant 13.9 meters in azimuth 87° 01' is marked in a similar manner. There is a pile of stone 4 feet high distant 30 meters in azimuth 92° 01'.

Tongue (U. S. E.) (Clatsop County, U. S. E., 1913). On Tongue Point, on the bluff above the rock crusher and east of the trail from the rock crusher to the convict camp. The station is marked according to note 1.¹ The reference mark is described in note 7.¹ See note 3.¹

Water (Clatsop County, E. B. L., 1913). There is no permanent mark for this station, owing to the high water. A pole was nailed to the roots of a stranded tree.

Rocky Point 2 (Wahkiakum County, Wash., E. B. L., 1913). On Elliott Point, one-fourth mile east of Elliott Landing, on a rocky point 6 meters from the edge of the bank, and 20 feet above the mean stage of the river. The station

¹ See pp. 81 and 82.

is marked according to note 2.¹ The reference mark is a galvanized-iron pipe filled with and set in concrete, with a copper tack in its top surface. There is a triangular blaze on a maple tree distant 30.82 meters in azimuth $112^{\circ} 19' 30''$. See note 3.¹

Wharf (Clatsop County, E. B. L., 1913). This station was on a wharf which was lost in July, 1913.

Jim Crow (U. S. E.) (Wahkiakum County, Wash., U. S. E., 1913). On Jim Crow Point, near the middle of a sharp ridge one-fourth mile southeast of Brookfield. The station is marked according to note 1.¹ There is a triangle blazed on a fir tree distant 5.13 meters. The relation of Jim Crow Point (U. S. E.) to Jim Crow Point is given in the list of positions.

Raspberry (U. S. E.) (Clatsop County, U. S. E., 1913). On a sidehill, one-fourth mile west of Cathlamet Point. The station is marked according to note 1.¹ There are no reference marks.

Three Tree Point (U. S. E.) (Wahkiakum County, Wash., U. S. E. 1913). On Three Tree Point, about 20 feet above the mean stage of the river. The station is marked according to note 1.¹ See the description of Three Tree Point.

Ten (Clatsop County, E. B. L., 1913). At the northeast end of Tenasillihee Island, on the northwest bank of Multnomot Slough. The station was a flag in a tree. The reference mark is the same as is described in note 5.¹ See note 3.¹

Dike (Wahkiakum County, Wash., E. B. L., 1913). On Hunting Island, about $1\frac{1}{2}$ miles northwest of Cathlamet, on a small dike, and about 4 feet above the high-water mark. The station is marked according to note 2.¹ The reference mark is the same as described in note 6.¹ There is a triangle blazed on a willow tree distant 23.8 meters in azimuth $315^{\circ} 12'$, also one on a large spruce tree near the river bank distant 65.15 meters in azimuth $330^{\circ} 53'$.

Mud (Clatsop County, E. B. L., 1913). On Tenasillihee Island, opposite Hunting Island light, about $1\frac{1}{4}$ miles northwest of Cathlamet, and below the high-water level of the river. The station is marked by a $1\frac{1}{2}$ -inch galvanized iron pipe, 5 feet long, and projecting 3 feet above the ground. The pipe is filled with cement, with a standard disk station mark set in the top.

Barlow (Cowlitz County, Wash., E. B. L., 1913). On Barlow Point, below the high-water stage of the river. The station is marked according to note 2,¹ except that the station mark is placed 1 foot below the surface of the ground. Reference mark No. 1 is the same as is described in note 7¹ and is 2 feet from the southeast corner of Barlow's dwelling. Reference mark No. 2 is described in note 5,¹ and is near the fence line at a large gate.

Quarry (U. S. E.) (Cowlitz County, Wash., U. S. E., 1913). On the southeast end of the wharf of the Star Sand Co., northwest of the ramp. The station is marked by a triangle of nails with one nail in the center. The following distances are given: Dolphin, 5.33 meters; edge of ramp, 0.82 meter; edge of wharf toward the river, 1.28 meters; and mooring pile, 0.54 meter.

Slaughter 2 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912; 1913). On the wharf at Slaughter Landing, 1.28 meters from the edge of the wharf, 1.82 meters from the side of barn, and 4.26 meters up the river from an old mooring pile. The station is marked by a sixtypenny nail at the center of a cross of twentypenny nails, surrounded by a triangle cut in the plank. Reference mark No. 1 is described in note 7,¹ except there is no underground mark, and reference mark No. 2 is a 3-foot length of $1\frac{1}{2}$ -inch galvanized-iron pipe with a standard disk reference mark set in its top with cement. See note 3.¹

Curve (U. S. E.) (Columbia County, U. S. E., 1912). On the south side of the tracks of the Spokane, Portland & Seattle Railway, near the middle of a curve, distant 1.52 meters from the south rail and 88.42 meters southeast from a road crossing the railroad. The station is marked according to note 1.¹

Tangent (U. S. E.) (Columbia County, U. S. E., 1912). South of the tracks of the Spokane, Portland & Seattle Railway, 228.6 meters in a northwesterly direction from a telephone pole. The station is marked according to note 1.¹

Beach 2 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1913). The station is 7 meters outside the high-water line and is marked according to note 1.¹

Bourne (U. S. E.) (Columbia County, U. S. E., 1912). South of the tracks of the Spokane, Portland & Seattle Railway, about midway between the track and the line of telephone poles, and 38.09 meters northwesterly of the road to the dock. The station is marked according to note 1.¹

A 2 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). Three meters from the river bank, near a sorting gap in a log boom. The following distances are given: To a triangle blazed on a cottonwood tree with a nail in the center, northerly 4.87 meters; to a triangle with a nail in the center, easterly 5.49 meters; and to a pump upstream, approximately east-southeast 42.54 meters. The station is marked according to note 1.¹

Hut (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). The station is on a small knoll. The following distances are given: To a cottonwood tree, northwesterly 4.47 meters; to apple tree, easterly 4.66 meters; to northwest corner of old house, easterly 8.37 meters; and to a telephone pole, southwestly 15.97 meters. The station is marked according to note 1.¹

Mill (U. S. E.) (Columbia County, U. S. E., 1912). In the town of Rainier, near the Columbia Door Co.'s mill, on a side hill southwest of the tracks of the Spokane, Portland & Seattle Railway. The following distances are given: To the corner of wall, 6.03 meters southeasterly; to face of wall, 4.62 meters southerly; to corner of wall, southwestly 5.41 meters; and to a flagpole, 14.69 meters. The station is marked according to note 1.¹

Wood 2 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). Upriver or southeasterly from a slough approximately 60 meters. The station is marked by a pipe set in a concrete monument buried 2 feet in the ground. The following distances are given: To a blazed cottonwood tree, northwesterly 8.93 meters; to a blazed cottonwood tree, north 9.60 meters; to a blazed cottonwood tree, southwestly 18.44 meters.

¹ See pp. 81 and 82.

Dock (U. S. E.) (Columbia County, U. S. E., 1912). In the city of Rainier on the wharf of the Pacific National Lumber Co. The station is marked by a twentypenny nail surrounded by eightpenny nails driven at irregular intervals and a triangle cut in the plank. The following distances are given: To a mooring pile, westerly 0.76 meter; to the river edge of the wharf, northerly 0.45 meter; and to the west edge of log chute, easterly 8.44 meters.

Net 2 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). Opposite Rainier and 0.6 meter west of the center line of the street on which the Rainier post office is located, 7.62 meters from the river bank. The station is marked according to note 1.¹

Rainier 2 (U. S. E.) (Columbia County, U. S. E., 1912). In the city of Rainier, near the northwest corner of Water and Virginia Streets. The following distances are given: Eastern curb line of Virginia Street, easterly 7.62 meters; southwest corner of sheet iron building on the northeast corner of Virginia and Water Streets, easterly 14.53 meters; northwest corner of concrete block building on the northeast street corner, southeasterly 35.05 meters; cross on Water Street curb, southeasterly 5.03 meters; and cross on Water Street curb, southwestly 4.61 meters. The station is marked according to note 1.¹

Bluff (U. S. E.) (Columbia County, U. S. E., 1912). On a sharp rocky ridge south of the tracks of the Spokane, Portland & Seattle Railway. The station is marked according to note 1.¹

Cowlitz 2 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). At the junction of the Columbia and Cowlitz Rivers, outside the high-water line and south of the line of the jetty. The station is marked according to note 1.¹

D 10 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). Approximately 244 meters southeast of the northwestern end of Cottonwood Island and 9 meters inside the high-water line. The station is marked according to note 1.¹ The following distances are given: To a nail in a notched blaze in a cottonwood stump northerly 18.04 meters; to a nail in a triangle blazed on a forked ash northeasterly 20.7 meters; to the center of a small knoll southeast approximately 60 meters.

D 9 (U. S. E.) (Columbia County, U. S. E., 1912). On a sharp ridge between the tracks of the Spokane, Portland & Seattle Railway and the Columbia River. The station is marked according to note 1.¹

D 8 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). About midway of the western shore of Cottonwood Island and 30 meters inshore from the high-water line. The station is marked according to note 1.¹ The following distances are given: To Cottonwood Island upper range rear light westerly 38.31 meters; to a nail in a blaze in a large cottonwood north-northwesterly 12.34 meters; to a nail in a blaze in a crooked cottonwood northerly 20.79 meters; to a nail in a blaze in a cottonwood easterly 17.07 meters.

D 7 (U. S. E.) (Columbia County, U. S. E., 1912). On a rocky ledge about one-fourth mile above Thayer's dock and about 8 feet above low water. The station is marked by a concrete monument with the station name and the letters "U. S. E." on its top surface.

D 6 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). Approximately 90 meters north of the southerly end of Cottonwood Island and 18 meters inside of the high-water line. The station is marked according to note 1.¹ The following distances are given: To a forked cottonwood tree with a nail in an irregular blaze north-northeasterly 10.05 meters; to a high cottonwood stump with one limb easterly 13.87 meters.

D 5 (U. S. E.) (Columbia County, U. S. E., 1912). Between the tracks of the Spokane, Portland & Seattle Railway and the top of the bank of the Columbia River, 6.1 meters from the east rail, 1.52 meters from the top of the ripped bank of the river, and 38 meters north of the north end of the railroad trestle. The station is marked according to note 1,¹ and is the same as station Twenty of the previous triangulation by the Corps of Engineers, United States Army.

D 4 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). Up river from logging dock and old fish trap and 4.3 meters outside the high-water line. The station is marked according to note 1.¹ The following distances are given: To a blazed willow northeasterly 25.15 meters; to a blazed willow easterly 26.82 meters.

D 3 (U. S. E.) (Columbia County, U. S. E., 1912). At the edge of a bluff above Beaver Lumber Co. The station is marked according to note 1.¹ The distance to the smaller of two rocks off shore east-northeasterly in the direction of *D 4 (U. S. E.)* is 33.5 meters.

D 1 (U. S. E.) (Columbia County, U. S. E., 1912). Near cable landing sign, on a bench of rocks 15 feet above low water. The station is marked according to note 1.¹

D 2 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). Down river 25 meters from Le Roy's float and stranded scows. The station is marked according to note 1.¹ North-northeasterly 28.49 meters is a willow tree 16 inches in diameter with a blaze and notch on it, and south-southeasterly 29.20 meters is a cottonwood tree 24 inches in diameter with a nail in a blaze.

Kalama (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). The station is outside the high-water mark and is marked according to note 1.¹

Coffin Rock (U. S. E.) (Columbia County, Wash., U. S. E., 1913). On the southern end of Coffin Rock. The station is marked according to note 1.¹

H 27 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). On the river bank about 6 feet above low water and 60 meters inside of the high-water line. The station is marked according to note 1.¹

H 30₂ (U. S. E.) (Columbia County, U. S. E., 1912). About one-fourth mile northwest of the Spokane, Portland & Seattle Railway station at Goble, on the fourth crib of the abandoned Northern Pacific Railway ferry slip counting

¹ See pp. 81 and 82.

from the northwest end. Midway, north and south, and 1.8 meters from the western end of the crib. The station is marked according to note 1.¹

Mill (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912; 1913). About 1 mile down the river from Kalama, on the outer edge of the wharf of the Mountain Timber Co., west-northwest from the western end of the sawmill, and at a break in the wharves connected by a truss bridge. The station is marked by a twentypenny nail surrounded by a triangle of sixpenny nails. The following distances are given: To the river edge of the wharf 0.55 meter, to the shoulder in the wharf 0.61 meter, and to the electric pole southeasterly 1.83 meters.

H 28 (U. S. E.) (Columbia County, U. S. E., 1912). On a rocky knoll at Reuben, west of the tracks of the Spokane, Portland & Seattle Railway, and north of the north line of the old wharf. The station is marked according to note 1.¹

Bank (Cowlitz County, Wash., E. B. L., 1913). About one-half mile south of Kalama Slough, 2 meters from the bank of the river, and approximately 6 feet above low water. The station is marked according to note 2.¹ The reference mark is according to note 5.¹ See note 3.¹

Dock (Columbia County, E. B. L., 1913). On the northeast corner of the Beaver Lumber Co. wharf, Prescott. The station is marked by a nail with the head filed off, surrounded by a triangle of copper tacks.

Rail (Cowlitz County, Wash., E. B. L., 1913). About one-fourth mile southeast of Carrolls Bluff on the right of way of the Northern Pacific Railway, and between the tracks and the river. The station is marked according to note 2.¹

Cotton (Cowlitz County, Wash., E. B. L., 1913). On the western side and southern end of Cottonwood Island, one-half mile west of Carrolls Bluff. The station is marked according to note 2.¹ Reference mark No. 1 is a galvanized iron pipe filled with earth and cement and set in concrete with a copper tack in its top surface, and reference mark No. 2 is according to note 7. See note 3.¹ There is a triangle on a cottonwood tree distant 45.62 meters in azimuth $234^{\circ} 43' 45''$ and a similar mark on another cottonwood tree distant 50.79 meters in azimuth $290^{\circ} 19' 25''$.

Cut (Columbia County, E. B. L., 1913). About 1 mile northwest of Prescott, on a rounded point between the tracks of the Spokane, Portland & Seattle Railway and the Columbia River. At the fourth rail northwest of the beginning of the curve in the track. The station is marked by a standard disk station mark set in a concrete pier in loose rock about 1 foot deep. The reference mark is a cross cut in stone with the longer arm pointing to the station. See note 3.¹

Twenty-six 2 (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Twenty-four 2 (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Nineteen 2 (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Seventeen 2 (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Thirteen 2 (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Cottonwood Island 1913 (Cowlitz County, Wash., E. B. L., 1913). On the western shore of Cottonwood Island, midway its length. The station is marked according to note 2.¹ Reference mark No. 1 is a section of iron pipe filled with earth and cement and set in concrete, with a copper tack in its top surface. Reference mark No. 2 is according to note 7,¹ except there is no underground mark. See note 3.¹

Old (Columbia County, E. B. L., 1913). About 1 mile southeast of Rainier, opposite the lower end of Cottonwood Island, one-fourth mile west of the Western Lumber Co.'s shingle mill, 3 meters from the bluff, and 12 feet above low water. The station is marked according to note 2.¹ The reference mark is according to note 5.¹ The post of the abandoned Doblebower front range is distant 6.5 meters in azimuth $318^{\circ} 08'$. See note 3.¹

Knight (Columbia County, E. B. L., 1913). About one-fourth mile north of Goble station, on a high rocky knoll at the lower end of a ferry slip, between the road and the Spokane, Portland & Seattle Railway. The station is marked by a standard disk station mark set in a pier of concrete built on rock. The top of the pier is about 10 inches above the surface of the surrounding stone. Reference mark No. 1 is according to note 5,¹ and No. 2 is a cross cut in stone, the longer arm being in the direction of the station. See note 3.¹

Kalama (Cowlitz County, Wash., E. B. L., 1913). About one-fourth mile south of the town of Kalama, between the Pacific highway and the Northern Pacific Railway track, 7 meters from the top of the rock cut of the railroad. The station is marked according to note 2.¹ The reference mark is the same as is described in note 5.¹ See note 3.¹

Slue (Columbia County, E. B. L., 1913). On a sand flat, 50 meters from the river shore, and 200 meters north of the mouth of Deer Island Slough. See description of *H 26₂ (U. S. E.)*. Reference mark No. 1 is described in note 7,¹ except there is no underground mark, and reference mark No. 2¹ is a section of galvanized-iron pipe filled with earth and cement and set in concrete, with a copper tack in its top surface. See note 3.¹

H 26₂ (U. S. E.) (Columbia County, U. S. E., 1912). The station is marked according to note 1, but in July, 1913, the station was covered with 6 inches of sand. See the description of *Slue*.

Rock (Cowlitz County, Wash., E. B. L., 1913). About $1\frac{1}{2}$ miles south of Kalama, in the Pacific highway, about 60 meters east of the Northern Pacific Railway tracks. There is no station mark. Both reference marks are the same as described in note 7,¹ except there is no underground mark.

Flat (Columbia County, E. B. L., 1913). On Deer Island, approximately midway between Deer Island Point and Deer Island Slough, on a sand flat 10 meters from the river shore. The station is marked according to note 2.¹ Reference mark No. 1 is a section of galvanized-iron pipe filled with earth and cement and set in concrete with a copper tack in its upper surface, and No. 2 is the same as is described in note 7,¹ except there is no underground mark.

H 21 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912, 1913). On a rocky knoll 15 meters south-southeast from the southeast corner of a small house. The station is marked according to note 1.¹ The reference mark is a standard

¹ See pp. 81 and 82.

disk reference mark set in a hole drilled in rock and cemented. There is a triangle on a maple tree distant 28 meters in azimuth $272^{\circ} 15'$.

H 23₂ (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912; 1913). On Ahles Point, east of the railroad tracks, easterly from the shingle mill, and 6 meters from the top of the railroad cut. The station is marked according to note 4.¹ The nearest telephone pole is northerly 9.17 meters. The reference mark is described in note 5.¹ See note 3.¹

H 22 (U. S. E.) (Columbia County, U. S. E., 1912, 1913). In a cleared space behind dense willows, 23.8 meters inside the high-water line. The station is marked according to note 4.¹ The reference mark is the same as is described in note 7,¹ except there is no underground mark. See note 3.¹

H 19 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912, 1913). The station is 12 meters northwest from the top of the bluff river bank and 111 meters southerly from the north gable of a yellow house. The station is marked according to note 1.¹ The reference mark is the same as is described in note 5.¹ There is a blazed triangle on a pine tree distant 10.90 meters in azimuth $299^{\circ} 26'$.

Hill (U. S. E.) (Cowlitz County, Wash., 1912, 1913). On a hill back of Bybee Light, northeast of the railroad tracks. The station is marked according to note 1.¹ The reference mark is the same as is described in note 5.¹ See note 3.¹

H 20 (U. S. E.) (Columbia County, U. S. E., 1912, 1913). On a small knoll on Deer Island between two ponds, one-half mile west from the river bank, and 10.6 meters from the shore of the lake toward the river. The station is marked according to note 4.¹ The reference mark is the same as is described in note 5.¹ See note 3.¹

Connell 2 (U. S. E.) (Columbia County, U. S. E., 1912; 1913). On the south side of a lane and 15 meters inside the high-water line, south-southeast from Mr. Connell's house, and 10 feet above low water. The station is marked according to note 4.¹ The reference mark is the same as is described in note 5.¹ There is a cottonwood stump westerly 9.75 meters. See note 3.¹

Martin 3 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912; 1913). On the western shore of Martin's Island, 10 meters from the bank inside the high-water line. The station is marked according to note 1,¹ with the exception that the mark is $1\frac{1}{2}$ feet below the surface. The reference mark is the same as is described in note 5.¹ There are triangles blazed on three cottonwood trees, one north-northeast 6.43 meters, one east 3.84 meters, and one south-southeast 10.88 meters. See note 3.¹

H 16₂ (U. S. E.) (Columbia County, U. S. E., 1912; 1913). Between the piles on Deer Island dike, about 30 meters outside the high-water mark. The station is marked according to note 1.¹

H 13₂ (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912; 1913). About 150 meters north from Burkes Slough and 10 meters inside the high-water line. The station is marked according to note 4.¹ The reference mark is according to note 7,¹ except there is no surface mark. There is a triangular blaze on a cottonwood tree distant 4.83 meters in azimuth $236^{\circ} 31'$, a similar marked cottonwood tree is distant 3.95 meters in azimuth $63^{\circ} 13'$, and a third tree marked in the same manner is southeast 9.81 meters. The Engineer's station *Keg*, cross boards on a tree, is south 25.1 meters. See note 3.¹

H 11 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912; 1913).—The station is outside the high-water line and is marked according to note 1.¹ The reference mark is the same as is described in note 5.¹ See note 3.¹

H 14₂ (U. S. E.) (Columbia County, U. S. E., 1912; 1913). On a bank 12 meters inshore from the high-water line, 0.76 meter northeast of a wire fence, and 8 feet above low water. The station is marked according to note 4.¹ The reference mark is the same as is described in note 5¹ and is near the barbed-wire fence. See note 3.¹

H 9₂ (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912; 1913). About 25 meters inshore from the high-water mark, 50.20 meters north of the northwest corner of Caple's barn, 27.9 meters south of the southeast corner of a small house. The station is marked according to note 1,¹ with the exception that the top of the monument is 18 inches below the surface. The reference mark is the same as is described in note 7, except there is no underground mark,¹ and is near an old oak tree back of the unpainted house. See note 3.¹

Dock (U. S. E.) (Columbia County, U. S. E., 1912; 1913). Near the southeastern corner of the Peninsula Lumber Co.'s wharf. The station is marked by a sixtypenny nail at the intersection of two lines of eightpenny nails and is 0.84 meter from the offshore edge and 0.82 meter from the south edge of the wharf.

H 7₂ (U. S. E.) (Cowlitz County, Wash., 1912; 1913). About one-half mile up the river from Caples Landing and 23 meters inside the high-water line. The station is marked according to note 4,¹ except that the monument is 18 inches below the surface of the ground. The reference mark is the same as is described in note 5.¹ There is a blazed willow tree with a nail driven in it northerly 24.38 meters and a similarly marked willow tree easterly 24.26 meters. See note 3.¹

H 8₂ (U. S. E.) (Columbia County, U. S. E., 1912; 1913). On a stone-filled wharf at Columbia City, 27.28 meters from the eastern end of the storehouse, 10.67 meters west from the outside face of the wharf, and 5.49 meters north of the southern face of the crib work of the wharf. The station is marked by a $1\frac{1}{2}$ -inch iron pipe driven into the loose stones with cement around it. The cement is marked with the name of the station. The reference mark is the same as is described in note 5.¹ See note 3.¹

H 5₂ (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912; 1913). The station is 18 meters from the river bank, 43.6 meters south of a lane, and is marked according to note 4.¹ The reference mark is described in note 7, except there is no underground mark.¹ There is a blazed cottonwood tree southeast 16.52 meters. See note 3.¹

¹ See pp. 81 and 82.

H 6₂ (U. S. E.) (Columbia County, U. S. E., 1912; 1913). On a rocky point about 1 mile below St. Helens, 200 meters below a rock crusher, and about 25 feet above low water. The station is marked according to note 4.¹ The reference mark is the same as is described in note 7,¹ except no underground mark. See note 3.¹

H 3 (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912; 1913). In the riprap on the offshore end of St. Helens Jetty. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except no underground mark. See note 3.¹

H 4 (U. S. E.) (Columbia County, U. S. E., 1912; 1913). The station is on the northern end of Sauvies Island, on recently made ground, and is marked according to note 1.¹ The reference mark is described in note 5.¹ See note 3.¹

H 1₂ (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912; 1913). The station is 45 meters inshore from the high-water line and is marked according to note 4.¹ The reference mark is the same as is described in note 7,¹ except no underground mark. There is a triangular blaze on a box-elder tree distant 81.69 meters in azimuth 207° 13'.

Warrior (U. S. E.) (Columbia County, U. S. E., 1912; 1913). On Warrior Point, 1.1 meters east of the easternmost part of the house. The station is marked according to note 4.¹ The reference mark is described in note 5.¹ The following distances are given: To the northeast corner of the house 4.81 meters, to the first angle of the bay window 2.00 meters, to the second angle of the bay window and the nearest corner of the house 1.34 meters, to a locust tree northeast 3.60 meters. See note 3.¹

Lake (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). At the junction of the Lewis and Columbia Rivers 10.5 meters inside the Columbia River high-water line. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except no underground mark. There is a triangular blaze on a willow tree with a nail in the center distant 8.66 meters in azimuth 308° 33', and a similar blaze on another willow tree southerly 24.00 meters. See note 3.¹

Eleven (U. S. E.) (Columbia County, U. S. E., 1912; 1913). The station is marked according to note 4,¹ and is 9 meters from the shore line. The reference mark is described in note 7,¹ except no underground mark. The following distances and directions are given: To blaze on cottonwood tree distant 22.65 meters in azimuth 12° 18', to a triangular blaze on a cottonwood tree distant 17.70 meters in azimuth 139° 39', and to an engineer's blaze northeast by north 13.29 meters. See note 3.¹

Ten (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). The station is 9 meters from the bank of the river and is marked according to note 4.¹ The reference mark is described in note 7,¹ except no underground mark. The following distances to blazes on willow trees are given: Northwest, 4.33 meters; northeast, 8.78 meters; nail in blaze east-northeast, 15.00 meters; nail in blaze southeast, 8.80 meters; nail in blaze south-southwest, 8.72 meters. See note 3.¹

Nine (U. S. E.) (Columbia County, U. S. E., 1912; 1913). Southeasterly from the southeast corner of the H. and R. Duck Club and 6 meters from the river bank. The station is marked according to note 1,¹ except that the top of the pipe is about 2 feet below the surface of the ground. The reference mark is described in note 7,¹ except no underground mark. There is a large stump east by south 4.27 meters and a nail in a fence post westerly 17.46 meters. See note 3.¹

Eight (U. S. E.) (Clarke County, Wash., U. S. E., 1912). The station is 60 meters south of a barbed-wire fence and is marked according to note 1.¹ There is an engineer's blaze north-northeasterly 20.1 meters, one easterly 13.81 meters, and a blaze on a cottonwood tree southwesterly 7.92 meters.

Seven 2 (U. S. E.) (Columbia County, U. S. E., 1912; 1913). On the river bank about 150 meters south of the Lionite Powder Works wharf and 20 feet above low water. The station is marked according to note 4,¹ except the mark is 18 inches below the surface. The reference mark is described in note 7,¹ except there is no underground mark. There is a triangle blazed on a tree distant 18.55 meters in azimuth 63° 45', and a similar mark on another tree distant 22.10 meters in azimuth 116° 38'. See note 3.¹

Six (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). On the river bank 8 feet above low water. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except there is no underground mark. The following distances and azimuths are given: Triangular blaze on cottonwood tree distant 16.50 meters in azimuth 274° 09'; triangular blaze on cottonwood tree distant 7.65 meters in azimuth 20° 15'. The following distances and directions are given: Blaze on tree north-northeast 18.1 meters; triangular blaze on cottonwood tree east by north 17.37 meters; tree blazed on both sides west by north 8.47 meters. See note 3.¹

Five 2 (U. S. E.) (Columbia County, U. S. E., 1912; 1913). About 300 meters south from Henrici's old house, and northeast from the yellow house on the mound. The station is marked according to note 4.¹ Reference marks No. 1 and No. 2 are described in note 7,¹ except no underground mark. There is a hickory tree distant 41.05 meters in azimuth 258° 17'. The northeast corner of the picket fence is south-southwesterly 41.7 meters and the northwest corner is southwest by south 55.41 meters. See note 3.¹

Two (U. S. E.) (Clarke County, Wash., U. S. E., 1912).—Lost.

One 2 (U. S. E.) (Columbia County, U. S. E., 1912; 1913). In an open field 16 meters from the top of the river bank, and 10 feet above low water. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except no underground mark. The northwest corner of a large barn is distant 22.55 meters. See note 3.¹

D (U. S. E.) (Columbia County, U. S. E., 1912; 1913). Seven meters from the top of the bank and 10 feet above the low water. The station is marked according to note 4.¹ The reference mark is described in note 5.¹ There is a nail in an old post southerly 14.2 meters and a nail in a blaze on a crooked willow tree northwesterly 24.1 meters. See note 3.¹

¹ See pp. 81 and 82.

A (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). Ten feet above low water and 10.6 meters from the top of the river bank. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except no underground mark. There is a triangular blaze with a nail in the center on a willow tree distant 30.7 meters in azimuth $214^{\circ}54'$, and a similar mark on another willow tree distant 28.1 meters in azimuth $300^{\circ}32'$. See note 3.¹

E (U. S. E.) (Columbia County, U. S. E., 1912; 1913). The station is an open space 15 meters from the high-water line and marked as in note 4.¹ The reference mark is described in note 7,¹ except no underground mark. There is a nail in a blazed willow tree distant 31.2 meters and a notched willow tree with a nail in a blaze west-southwest 28.8 meters. See note 3.¹

B (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). About 10 feet above low water, 12 meters from the top of the river bank, and 107 meters south-southeast from the southeast corner of an old building. The station is marked according to note 4.¹ The reference mark is described in note 5.¹ There is a blaze on a bushy tree northerly 25.03 meters, a blazed stump distant 6.72 meters in azimuth $247^{\circ}35'$, and a blazed stump distant 19.80 meters in azimuth $304^{\circ}14'$. See note 3.¹

Dead Willow (U. S. E.) (Columbia County, U. S. E., 1912; 1913). Abreast of new landing, 18 meters from the inshore end of the wharf, north of a rose thicket. The station is marked according to note 4.¹ The reference mark is described in note 5.¹ There is a large cottonwood tree distant 12.9 meters. See note 3.¹

C (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). About 50 meters from the river bank among large cottonwood and willow trees. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except there is no underground mark. There is a large cottonwood tree distant 19.12 meters in azimuth $83^{\circ}17'$, a small blazed cottonwood tree distant 1.10 meters in azimuth $172^{\circ}09'$, and a blazed cottonwood distant 6.42 meters in azimuth $305^{\circ}04'$. See note 3.¹

Grassy (U. S. E.) (Columbia County, U. S. E., 1912; 1913). In an open grass-covered space 10 meters from the high-water line and 137 meters southerly from the fence of a cultivated field. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except there is no underground mark. There is a nail in a blaze in a cottonwood tree southwesterly 18.1 meters and a similar mark on a cottonwood tree westerly 16.9 meters. See note 3.¹

Fales (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). Nine meters from the top of the river bank and 0.9 meter north of a wire fence. The station is marked according to note 4,¹ with the exception that the mark is covered with 6 inches of sediment. The reference mark is on the same side of the fence as the station mark and is described in note 7,¹ except there is no underground mark. See note 3.¹

Ridge (U. S. E.) (Columbia County, U. S. E., 1912; 1913). The station is in an open space about 70 meters from the river bank and is marked according to note 4.¹ The reference mark is on the inshore edge of a tongue of brushy woods and is described as in note 7,¹ except there is no underground mark. There is a blaze on a cottonwood tree southwesterly 13.9 meters and a similar mark on a cottonwood tree, distant 5.24 meters in azimuth $66^{\circ}53'$. See note 3.¹

W 11 (U. S. E.) (Clarke County, Wash., U. S. E., 1912). The station is 12 meters from the top of the river bank, 27 meters south of a slough, and is marked according to note 4.¹ There are three blazed trees in the vicinity, northeast, east, and east by south from the station.

W 16 (U. S. E.) (Columbia County, U. S. E., 1912; 1913). About 100 meters south of Willow Bar Point, about 30 meters north of a wire fence and at the top of the partially undermined river bank. The station is marked according to note 4.¹ Reference marks No. 1 and No. 2 are described in note 7,¹ except there is no underground mark. There is a triangle blazed on a cottonwood tree, distant 20.82 meters in azimuth $113^{\circ}15'21''$. See note 3.¹

W 14 (U. S. E.) (Columbia County, U. S. E., 1912; 1913). On the west edge of a road about 10 meters from the river bank, 90 meters south of the north face of Bonser's house and about 90 meters from Petes Island. The station is marked according to note 4.¹ The reference mark is on the east side of a fence and is described in note 7,¹ except there is no underground mark. See note 3.¹

W 9 (U. S. E.) (Clarke County, Wash., 1912; 1913). In the woods 10 meters from the top of the river bank marked according to note 4.¹ The reference mark is described in note 7,¹ except there is no underground mark. There is a blazed tree northerly 2.35 meters, one easterly 4.27 meters, and one southwesterly 2.38 meters. See note 3.¹

W 12₂ (U. S. E.) (Columbia County, U. S. E., 1912; 1913). In an open field about 305 meters west of the river bank and 150 meters north of a wire fence. The station is marked according to note 1.¹ There is a barn northeasterly about 244 meters, and the north chimney of a brick house is southeasterly about 245 meters.

W 7₂ (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). At the top of the river bank, entirely undermined, and will probably be destroyed during the next high water. The station is marked according to note 1.¹ Reference mark No. 1 is described in note 7,¹ except there is no underground mark, and No. 2 is a 1½-inch iron pipe set in and filled with cement. There is a 2-inch iron pipe set in the ground, distant 18.32 meters, a blaze on a willow tree north by east 6.4 meters, and 2 notches on a willow tree easterly 6.52 meters. See note 3.¹

W 10₂ (U. S. E.) (Columbia County, U. S. E., 1912; 1913). The station is 1 meter west of an old fence and 115 meters south from the south line of a barn, north 72 meters from the wire fence running east and west, and marked according to note 4.¹ The reference mark is described in note 5.¹ See note 3.¹

W 5₃ (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). The station is 22 meters from the river bank and is marked according to note 1,¹ except the station mark is 6 inches below the surface of the ground. The reference mark is described in note 7,¹ except there is no underground mark. See note 3.¹

¹ See pp. 81 and 82.

Range 2 (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). The station is on the river bank and is marked according to note 4.¹ The reference mark is described in note 7,¹ except there is no underground mark. There is a blaze on an old cottonwood tree, distant 32.0 meters in azimuth 286° 14'. See note 3.¹

W 8₂ (U. S. E.) (Columbia County, U. S. E., 1912). In a small field westerly from Reeder's house and 2.4 meters west of a north and south fence. The station is marked according to note 1,¹ except the top of the pipe is 2 feet below the surface of the ground. There is a nail in the center of a triangular blaze on a fence post north-northwest 27.4 meters and a similar mark north-northeast 18.8 meters.

W 6 (U. S. E.) (Columbia County, U. S. E., 1912; 1913). The station is on a point south of Reeder's landing on top of a partly undermined bank and is marked according to note 1.¹ The reference mark is described in note 7,¹ except there is no underground mark. The following directions and distances are given: Pipe in the ground 15.89 meters; blazed tree south-southwest 42.67 meters; blazed tree westerly 27.73 meters; blazed tree with one notch southwest 10.88 meters; blazed tree south-southwest 12.74 meters. See note 3.¹

W 3 (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). On the shore of a slough behind a new island at Willow Bar, 2.4 meters west of a barnyard fence and 9.3 meters south from the south side of a farm road. The station is marked according to note 1,¹ except that the mark is 2 feet below the ground. The reference mark is described in note 7,¹ except there is no underground mark, and is at the southwest corner of a barnyard outside the fence and in the farm road. The southwest corner of the barn is south-southwest 39.0 meters. See note 3.¹

W 4₂ (U. S. E.) (Multnomah County, U. S. E., 1912). The station is 90 meters north of Reeder's Point and is marked according to note 4.¹ The reference mark is described in note 5.¹ There is a blazed cottonwood tree north by east 14.0 meters, a cottonwood tree with a similar mark northeast 6.55 meters, and a small tree east-southeast 5.64 meters. See note 3.¹

W 1 (U. S. E.) (Clarke County, Wash., U. S. E., 1912). On a slough behind a new island near Willow Bar, in a cultivated field 100 meters north of a big barn. The station is marked according to note 1,¹ except the mark is 2 feet below the ground. There is a triangle, with a nail, on a fence N. 54° E. magnetic distant 23.77 meters and a nail on a fence post S. 75 E., distant 21.64 meters. There is a fence easterly 20.5 meters.

W 2₂ (U. S. E.) (Multnomah County, U. S. E., 1912; 1913). About 3 meters from the mud bank of the river, 6 feet above low water, and one-half meter north of a wooden fence. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except there is no underground mark, and is near the same fence as the station. The northeast corner of James McIntire's house is southwesterly 93.5 meters. There is a blazed tree west by south 40 meters and one west by north 35.5 meters. See note 3.¹

Jewetts (U. S. E.) (Multnomah County, U. S. E., 1912). About 150 meters west of the river bank and 22 meters east of a fence at Jewett's house. The station is marked according to note 1.¹ There is a blazed tree with three notches southwesterly 28.9 meters, a blazed tree west by north 21.9 meters, and a blazed tree with one notch northwesterly 30.2 meters.

Hewletts 2 (U. S. E.) (Clarke County, Wash., U. S. E., 1912). North of Hewletts Point, 10.5 meters east of the high-water line, 1.4 meters south of a fence, 8.8 meters northeast of the northeast corner of a shack, and west-southwesterly 44.5 meters from a blazed cottonwood tree. The station is marked according to note 4.¹

Morgans 2 (U. S. E.) (Multnomah County, U. S. E., 1912; 1913). At Morgans Landing, 10 meters west of the top of the riprapped river bank, 19.8 meters south of Morgan's barn, 27.85 meters south-southeast of the southwest corner of the barn, 1.5 meters south of the barnyard fence, and 4.3 meters east of a north and south fence. The station is marked according to note 4,¹ except that the mark is 6 inches below the surface. The reference mark is described in note 5.¹ See note 3.¹

One 3 (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). About 33 meters from the top of the river bank, 15 feet above low water, 0.6 meter south of an east and west fence and about 73 meters north of another one. The station is marked according to note 4.¹ The reference mark is described in note 5.¹ See note 3.¹

Two 2 (U. S. E.) (Multnomah County, U. S. E., 1912; 1913.) The station is in an open, uncultivated field and is marked according to note 4.¹ The reference mark is described in note 5.¹ See note 3.¹

Middle (Clarke County, Wash., E. B. L., 1913). About 30 meters from the east bank of the Columbia River, 150 meters northwest of Blurock Landing, and 15 feet above low water. The station is marked according to note 2.¹ The reference mark is described in note 5.¹ See note 3.¹

Four 2 (U. S. E.) (Multnomah County, U. S. E., 1912; 1913). On the west bank of the entrance of Willamette River, 8 feet above low water. The station is marked according to note 4.¹ The reference mark is described in note 5.¹ There is a blazed tree distant 16.4 meters in azimuth 70° 48', a triangular blaze on a tree distant 17.0 meters in azimuth 132° 37', and a blazed tree southerly 16.2 meters. See note 3.¹

Mud (Multnomah County, E. B. L., 1913). On Nigger Tom Island, 5 meters from the east shore of the Willamette River. The station is marked according to note 2.¹ Reference marks No. 1 and No. 2 are described in note 5.¹ See note 3.¹

School (Multnomah County, E. B. L., 1913). About 200 meters from the west shore of the Willamette River, opposite Percy Slough. The station is marked according to note 2.¹ The reference mark is described in note 5.¹ The station is 45.8 meters south of the north fence corner, 30.3 meters north of the south corner, and 2 meters from the fence toward the river. See note 3.¹

¹ See pp. 81 and 82.

Three 3 (U. S. E.) (Clarke County, Wash., U. S. E., 1912; 1913). About one-half mile south of Blurock Landing, 34.7 meters east of a fence parallel with the river and 0.4 meter south of a fence at right angles to the river. The station is marked according to note 4.¹ The reference mark is 1.2 meters south of a fence and is described in note 5.¹ See note 3.¹

End (Multnomah County, E. B. L., 1913). About 30 meters from the top of the west bank of the Columbia River, 200 meters north of the Willamette River entrance, and 15 feet above low water. The station is marked according to note 2.¹ The reference mark is described in note 5.¹ There is a triangular blaze on a dead tree distant 14.1 meters in azimuth 27° 38'. See note 3.¹

Pen (Multnomah County, E. B. L., 1913). On the east bank of the Willamette River, opposite the lower end of Post Office Bar, 200 meters from the northwest shore of Ramsey Lake, and 125 meters north of the line of woods. The station is marked according to note 2.¹ The reference mark is described in note 5.¹ See note 3.¹

Linton (Multnomah County, E. B. L., 1913). About one-fourth mile west of Linton and about three-fourths of the way up the hillside. The station is marked according to note 2.¹ The reference mark is described in note 5.¹ There are two blazed fir trees, one distant 6.5 meters in azimuth 10° 11', and the other distant 5.3 meters in azimuth 304° 2'. See note 3.¹

Sand (Multnomah County, E. B. L., 1913). On a sand spit on the east side of the Willamette River, 30 meters from the shore. The station is marked according to note 2.¹ The reference mark is described in note 5.¹ See note 3.¹

Howell (Columbia County, C. R., 1881; 1913). On the west shore of the Willamette River, 113 meters from the top of the bank, 2.3 meters from a fence. The station is marked by a bottle 3 feet below the surface, and directly over this, 1 foot below the surface, is a drill hole in a rock. At the surface there is a standard disk station mark set in concrete. Reference marks Nos. 1 and 2 are described in note 5.¹ See note 3.¹

Gatton (Multnomah County, C. R., 1883; 1913). About 2 miles north of St. Johns, near the end of the high ground between the Columbia and Willamette Rivers, 8 meters south of the top of the bluff. The station is marked by a bottle with a copper tack in the cork buried 3 feet deep; 14 inches below the surface there are 3 bottles with the necks pointing to the station, and at the surface is a standard disk station mark set in concrete. Reference mark No. 1 is described in note 5,¹ and No. 2 is a drill hole filled with lead in a large basaltic rock. See note 3.¹

Springville (Multnomah County, C. R., 1883). On the west bank of the Willamette about 1 mile below St. Johns, about 200 feet above the river level on a sloping bench of land immediately back of an old burnt wharf called Springville. The station is marked according to note 8.¹ There are three cedar stakes around the station as follows: South 1.87 meters, east 1.86 meters, and west 1.83 meters.

Watts (Multnomah County, C. R., 1883). On the west side of the Willamette River, on the right of way of the Northern Pacific Railway and 13.4 meters west of the tracks, and 1.64 meters inside the fence. The station is marked according to note 8.¹ There are three cedar stakes around the station as follows: North 1.77 meters, west 1.78 meters, and east 1.77 meters.

Kaiser (Multnomah County, C. R., 1883). On the hillside west of the county road and the railroad. The station is marked according to note 8.¹ There are three cedar stakes around the station, as follows: North 1.86 meters, south 1.89 meters, and east 1.71 meters.

St. John (Multnomah County, C. R., 1883). On low bottom land close to the shore, 17 meters northeast of a fence running across from the hills, 5.5 meters south of a group of ash tree stumps. The station is marked according to note 8.¹ There are three cedar stakes around the station bearing north, south, and east, respectively, and each distant 1.83 meters.

Caples (Multnomah County, C. R., 1883; 1913). About one-half mile from the business center of St. Johns, 5 meters from the edge of a sand bluff abreast of St. Johns dry dock, and 100 feet above low water. The station is marked by a tack in the cork of a bottle 3 feet below the surface; buried 1 foot are 3 bottles with their necks pointing to the station, and at the surface there is a drill hole filled with lead in a large rock. The reference mark is described in note 5.¹ See note 3.¹

Hazel (Multnomah County, C. R., 1883). About 30 meters southwest of the Northern Pacific Railway tracks and about 90 meters above the 7-mile post from Portland. The station is marked according to note 8.¹ There are three cedar stakes around the station bearing north 1.83 meters, west 1.80 meters, and east 1.86 meters, respectively.

Waud (Multnomah County, C. R., 1882; 1883). On the east bank of the Willamette River about 1 mile above St. Johns, 9 meters from the edge of the bluff, and about 120 feet above the ordinary stage of the river. The station is marked according to note 8.¹ There are three cedar stakes with copper tacks in the top around the station, as follows: West 1.83 meters, east 1.83 meters, and south 1.87 meters.

Scott (Multnomah County, C. R., 1882; 1913). About 2 miles south of St. Johns, 1½ miles west of the north end of Swan Island, in the grounds of Cliff Inn. The station is marked by a tack in the cork of a bottle 3 feet below the surface, 14 inches below the surface by 3 bottles with their necks pointing to the station, and at the surface by a drill hole filled with lead in a rock. The reference mark is described in note 5.¹ The rear chimney of Cliff Inn is in azimuth 232° 41', and the round barn is in azimuth 307° 01'. See note 3.

Gravel Bluff (Multnomah County, C. R., 1882; 1883).—Lost.

Potter (Multnomah County, C. R., 1883). On the south side of the Willamette River about 4½ miles below Portland, 90 meters back of the county road, and 3 meters west of a rail fence inclosing a garden. The station is marked according to note 8.¹ The surface mark was reported lost in 1913.

¹ See pp. 81 and 82.

Montgomery (Multnomah County, C. R., 1882; 1883).—Lost.

King (Multnomah County, C. R., 1883). On the nose of a high ridge back of Portland in continuation of the blocks between F and G Streets, 10 meters back of the fence between the Johnson and King properties, and 13 meters from the fence corner. The station is marked according to note 8,¹ except there is no surface mark.

Tibbets (Multnomah County, C. R., 1882; 1883). On the east side of the Willamette River nearly opposite the north end of Ross Island, nearly at the top of a bluff in a locality entirely cleared of trees. The station is marked according to note 8.¹ There are three cedar stakes around the station as follows: North 1.56 meters, south 1.89 meters, and west 1.83 meters.

Hoffmans Hill (Multnomah County, C. R., 1883). The station is marked according to note 8.¹ The surface mark was reported lost in 1913.

Forty (U. S. E.) (Multnomah County, U. S. E., 1909; 1913). On the south bank of the Willamette River, in the city of Portland, opposite the western end of Swan Island and about 8 feet above low water. The station is marked according to note 4.¹ The reference mark is described in note 5.¹ See note 3.¹

R (U. S. E.) (Multnomah County, U. S. E., 1909; 1913). About 270 meters eastward of the western end of Swan Island and outside the high-water line. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except there is no underground mark. See note 3.¹

Thirty-nine 2 (U. S. E.) (Multnomah County, U. S. E., 1912). On a hill in St. Johns, about 100 feet above low water and about 100 meters from the Standard Oil Co.'s dock. The station is marked according to note 1.¹

Thirty-eight 2 (U. S. E.) (Multnomah County, U. S. E., 1899). The station is in an open field and is marked according to note 17.¹

Dike (U. S. E.) (Multnomah County, U. S. E., 1899). The station is on a high bluff behind a sawmill and is marked according to note 17.¹

Thirty-seven (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Thirty-eight (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Forty-one (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Forty-two (U. S. E.) (Multnomah County, U. S. E., 1892). The station is near a slough and is marked by a pipe.

Forty-three (U. S. E.) (Multnomah County, U. S. E., 1906). The station is marked by a pipe.

Forty-four (U. S. E.) (Multnomah County, U. S. E., 1909; 1913). On the south bank of the Willamette River, in the city of Portland, 8 feet above low water. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except there is no underground mark. See note 3.¹

F (U. S. E.) (Multnomah County, U. S. E., 1909). The station is on Swan Island and is marked according to note 1.¹

T (U. S. E.) (Multnomah County, U. S. E., 1909; 1913). On the edge of a bluff on the southwest side of Willamette Boulevard, in the city of Portland, and opposite the storehouse at 465 Lombard Street. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except there is no underground mark. See note 3.¹

P (U. S. E.) (Multnomah County, U. S. E., 1909; 1913). Nearly on the extension of the north curb line of Willamette Avenue, in front of No. 249 Willamette Boulevard, Portland. The station is marked according to note 4.¹ The reference mark is described in note 7,¹ except there is no underground mark. See note 3.¹

Thirty-six (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Forty-five (U. S. E.) (Multnomah County, U. S. E., 1906). The station is marked by a pipe, near P. F. Mills. (Harbor-line monument.)

Forty-five 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Forty-six 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Forty-seven (U. S. E.) (Multnomah County, U. S. E., 1906). The station is marked by a tack near the lower end of old ballast dock.

Forty-eight 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Forty-nine 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Fifty 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Fifty-one 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Fifty-two 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Fifty-three 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Fifty-four 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Fifty-five 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Fifty-six 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Fifty-seven 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Fifty-eight 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 16.¹

Fifty-nine 2 (U. S. E.) (Multnomah County, U. S. E., 1906). See note 17.¹

Thirty-five (U. S. E.) (Multnomah County, U. S. E., 1899). The station is at St. Johns and is marked by a pipe. It is a harbor-line monument.

Thirty-four (U. S. E.) (Multnomah County, U. S. E., 1899). The station is near a slough and is marked according to note 17.¹

¹ See pp. 81 and 82.

Thirty-three (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17,¹ and is a harbor-line monument.

Thirty-two (U. S. E.) (Multnomah County, U. S. E., 1899). This station is marked by a pipe and is a harbor-line monument.

Thirty (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Thirty-one (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Twenty-nine (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Twenty-eight (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Twenty-six (U. S. E.) (Multnomah County, U. S. E., 1899). Lost.

Twenty-seven (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Twenty-five (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Twenty-four (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Twenty-three (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Twenty-two (U. S. E.) (Multnomah County, U. S. E., 1899). The station is on a revetment.

Twenty-one (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Twenty (U. S. E.) (Multnomah County, U. S. E., 1899). Lost.

Nineteen (U. S. E.) (Multnomah County, U. S. E., 1899). Lost.

Eighteen (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Seventeen (U. S. E.) (Multnomah County, U. S. E., 1899). Lost.

Sixteen (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Fifteen (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Fourteen (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Thirteen (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Twelve (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Eleven (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Ten (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

Nine (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Eight (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Six (U. S. E.) (Multnomah County, U. S. E., 1899). Lost.

Seven (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked according to note 17.¹

Four (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe in a revetment.

Five (U. S. E.) (Multnomah County, U. S. E., 1899). The station is marked by a pipe.

SUPPLEMENTARY POINTS.

Jetty A (Clatsop County, J. S. H., 1909). On the jetty at the mouth of the Columbia River. The jetty has been measured and marked by the United States Engineers, and this station is at the Engineers' mark 33+00. There is no other station mark.

Jetty B (Clatsop County, J. S. H., 1909). On the jetty at the mouth of the Columbia River. The jetty has been measured and marked by the United States Engineers and this station is at their mark 146+85. There is no other station mark.

Jetty C (Clatsop County, J. S. H., 1909). On the jetty at the mouth of the Columbia River. The jetty has been measured and marked by the United States Engineers and this station is at their mark 179+36. The station is marked on the beam midway between the two tracks by three nails driven in to form a triangle.

Jetty D (Clatsop County, J. S. H., 1909). On the jetty at the mouth of the Columbia River. The jetty has been measured and marked by the United States Engineers and this station is at their mark 186+56. The station is marked on the beam midway between the two tracks by three nails driven in to form a triangle.

Jetty E (Clatsop County, J. S. H., 1909). On the jetty at the mouth of the Columbia River. The jetty has been measured and marked by the United States Engineers and this station is at their mark 246+10. The station is marked on the beam midway between the two tracks by three nails driven in to form a triangle.

Jetty F (Clatsop County, J. S. H., 1909). On the jetty at the mouth of the Columbia River. The jetty has been measured and marked by the United States Engineers and this station is at their mark 255+28. The station is marked on the beam midway between the two tracks by three nails driven in to form a triangle.

West end of jetty (Clatsop County, J. S. H., 1909). On the jetty at the mouth of the Columbia River. The station is marked on the beam midway between the two tracks by three nails driven in to form a triangle.

Gun (U. S. E.) (Clatsop County, U. S. E., 1905). The station is on a battery at Fort Stevens.

Smith (U. S. E.) (Clatsop County, U. S. E., 1905). The station is marked by a concrete monument.

Old Point Ellice (U. S. E.) (Pacific County, Wash., U. S. E., 1905). Lost.

Seal (U. S. E.) (Clatsop County, U. S. E., 1905). The station is marked by a concrete monument with a 2-inch pipe for the center.

Elliott (U. S. E.) (Wahkiakum County, Wash., U. S. E., 1905; 1913). Lost.

Marsh (U. S. E.) (Clatsop County, U. S. E., 1905; 1913). On Marshy Islands, below Woody Island. The station is marked according to note 1.¹ There are no reference marks.

¹ See pp. 81 and 82.

- Old Jim Crow* (U. S. E.) (Wahkiakum County, Wash., U. S. E., 1905). Lost.
- Astoria* (U. S. E.) (Clatsop County, U. S. E., 1905). The station is marked by a concrete monument with a 2-inch pipe in the center.
- Dot* (U. S. E.) (Clatsop County, U. S. E., 1905). The station is marked by a concrete monument with a 2-inch pipe for the center.
- Alderbrook* (U. S. E.) (Clatsop County, U. S. E., 1905). The station is marked by a concrete monument with a 2-inch pipe for the center.
- Old Tongue* (U. S. E.) (Clatsop County, U. S. E., 1905; 1913). This station was recovered in 1913, but the marking is not known.
- Bear* (U. S. E.) (Clatsop County, U. S. E., 1905). The station is marked by a concrete monument.
- Tongue Point Neck* (Clatsop County, R. D. C., 1851). On the summit of the ridge of the narrow neck of land connecting Tongue Point with the mainland, about 40 feet above the tide. The station is marked according to note 8,¹ except there is no surface mark.
- Shortis Chimney* (Clatsop County, R. D. C., 1852; 1885). The center chimney of a dilapidated house standing quite close to the shore between Upper Astoria and Tongue Point.
- Yellow Bluff* (Wahkiakum County, Wash., R. D. C., 1851). On the east side of Grays Bay on a bank 7 feet above the high-water mark. It is at the foot of a remarkable yellow bluff on ground formed by a slide from the hill above. The station is marked according to note 8.¹
- John Day Point* (Clatsop County, R. D. C., 1851). About 2 miles S. 42° E. magnetic from Tongue Point, 25 feet above the river, on a rocky point forming the eastern side of the mouth of John Day River. The station is marked according to note 8,¹ except there is no surface mark.
- Settlers Point* (Clatsop County, R. D. C., 1852). On a small clearing, 18 meters from the high-water mark, and 80 feet above the tide. The station is marked according to note 8,¹ except there is no surface mark.
- Grays Bay* (Wahkiakum County, Wash., R. D. C., 1852). Lost.
- Grays River* (Wahkiakum County, Wash., R. D. C., 1852). In the center of a small clearing, 3 feet above the tide, on the east side of the mouth of the Grays River. The station is marked according to note 8,¹ except there is no surface mark.
- Alamicut Point* (Wahkiakum County, Wash., R. D. C., 1852). On the extremity of Alamicut Point. The station is marked according to note 8,¹ except there is no surface mark.
- Welch* (Clatsop County, C. R., 1871). On a sand beach on the north side of an island on the south side of the main channel, about 520 meters from Welch's fish house. The station is marked according to note 9,¹ except the surface mark was omitted.
- Puget* (Wahkiakum County, Wash., C. R., 1871). On the extreme northwest point of Puget Island, 18 meters from the shore on each side. The station is marked according to note 8,¹ except there is no surface mark.
- Point Basalt* (Wahkiakum County, Wash., C. R., 1871). On the edge of the basaltic cliffs, 540 meters above the wharf, 60 meters from the shore, and 200 feet above the river. The station is marked according to note 9,¹ except the surface mark is omitted and the three stakes are distant 1.83 meters.
- Tenasillihee* (Clatsop County, C. R., 1871). About 10 meters from the shore on the northeast point of Tenasillihee Island. The station is marked according to note 9,¹ except that the surface mark is omitted, and the distance to the three stakes is 1.83 meters.
- Snag* (U. S. E.) (Clatsop County, U. S. E., 1905). The station is marked by a concrete monument with a 2-inch pipe for the center.
- Skamokawa* (U. S. E.) (Wahkiakum County, Wash., 1905). The station is marked by a concrete monument.
- Pole* (Wahkiakum County, Wash., E. B. L., 1913). About 1 mile west of Cathlamet on the lower or northern end of Puget Island, below high-water. The station is marked by a 1½-inch galvanized-iron pipe, 5 feet long and projecting 2 feet above the surface of the ground. The pipe is filled with cement and a standard disk station mark is set in the top.
- Bugby Hole Eccentric* (Clatsop County, E. B. L., 1913). About 200 meters north of Bugby Hole Creek and 5 rails north of the end of the Spokane, Portland & Seattle Railway trestle. The station is marked according to note 2,¹ with the addition that there is a 1½-inch galvanized-iron pipe extending from immediately under the standard disk station mark down nearly to the underground mark. The reference mark is the same as is described in note 5.¹ See note 3.¹
- Burroughs* (Wahkiakum County, Wash., C. R., 1872). About 2¼ miles above the wharf at Cathlamet, 10 meters from the edge of the bank, 154 feet above the river level, and 75 meters southeast of a small log cabin. The station is marked according to note 9,¹ except the surface mark and the stakes are omitted.
- Sandy Point* (Wahkiakum County, Wash., C. R., 1872). On the extreme northwest point of the second island above Cathlamet. The station is marked according to note 9,¹ except the surface mark and the stakes are omitted.
- Mouth* (Clatsop County, C. R., 1872). On a point of the island formed by the Columbia River and Westport Slough, and one-half mile below Westport Wharf. The station is marked according to note 8.¹
- Gruber* (Columbia County, C. R., 1873). About 80 meters from the bank of Westport Slough at the point where it makes a rectangular bend, on a bench of land 152 feet above tidewater. The station is marked according to note 8,¹ except there is no surface mark. Three stakes bear north, south, and east magnetic, distant 1.83 meters.

¹ See pp. 81 and 82.

Skunk Cabbage Ridge (Columbia County, C. R., 1873). About 4½ miles above Westport on the nose of a high ridge of land overlooking Marshfield, and 300 meters west of a small stream in a deep ravine. The station is marked according to note 8,¹ except the surface mark is a portion of the center pole of the old signal.

Holland (Columbia County, C. R., 1873). About 2 miles below Oak Point, 200 meters west of Mr. Holland's house, and about 12 meters from the shore. The station is marked according to note 8,¹ except the surface mark is a section of the original center pole of the signal. Three stakes bear north, south, and east magnetic, distant 1.83 meters.

Wallaces Island (Columbia County, C. R., 1873). On the sandy shore at the head of Wallaces Island. The station is marked according to note 8,¹ except the surface mark is omitted. Three stakes bear north, south, and east magnetic, distant 1.83 meters.

Eagle Cliff (Cowlitz County, Wash., C. R., 1873). About 1 mile east of George Hume's fishery, 1½ miles below the wharf at Oak Point, and nearly opposite Holland's fish house. The station is marked by a drill hole, filled with lead, in a large rock.

Alder Bluff (Cowlitz County, Wash., C. R., 1873). About 4 miles above Oak Point, 1½ miles from Solo Slough, on a basaltic cliff nearly perpendicular 130 feet above the river level. The station is marked according to note 8,¹ except there is no surface mark. Three stakes bear north, south, and east magnetic, distant 1.83 meters.

Monticello (Cowlitz County, Wash., C. R., 1873). Midway between Monticello and Freeport, 20 meters from the river bank, and 4 meters from a fence. The station is marked according to note 8,¹ except there is no surface mark. Three stakes around the station have the following magnetic bearings and distances: north 1.83 meters, east 1.83 meters, and south 1.89 meters.

Cowlitz (Cowlitz County, Wash., C. R., 1873). On the northwest side of the Columbia River at the mouth of the Cowlitz River, opposite Rainier, and 4 meters from the edge of the bank. The station is marked according to note 8,¹ except there is no surface mark. Three stakes around the station bear north, south, and east magnetic, distant 1.83 meters.

Cottonwood Island (Cowlitz County, Wash., C. R., 1873). About 1 mile east of the mouth of the Cowlitz River, on the lower end of Cottonwood Island, 20 meters from the north shore, and 30 meters from the south shore. The station is marked according to note 8,¹ except there is no surface mark. Three stakes were set bearing magnetic north, south, and east, distant 1.83 meters.

Bluff (U. S. E.) (Cowlitz County, Wash., U. S. E., 1912). On a bluff 10 meters south from the northwest corner of a powder house. The station is marked by a pipe driven in the ground.

Bend (U. S. E.) (Columbia County, U. S. E., 1912). On Deer Island Point, 27 meters inside the high-water line, and 24 meters from the willows and brush. The station is marked according to note 1.¹

H 24 (U. S. E.) (Columbia County, U. S. E., 1912). The station is 106.7 meters southwesterly from the high-water line, back in the bushes, and is marked according to note 1.¹

Old Orchard (Columbia County, C. R., 1878). On a bluff sandy bank on the south end of Deer Island, 9 meters from the shore, about 200 meters above a house. The station is marked according to note 8,¹ with the addition of a plank placed 6 inches above the underground mark, with a hole bored in it to mark the station. There are 3 stubs, with a copper tack in the top of each, distant 1.83 meters.

Maxwell (Cowlitz County, Wash., C. R., 1878). About 7 meters from the edge of a low bank, 60 meters southeast of the wharf at Maxwells Landing. The station is marked according to note 8.¹ Three stakes were set around the station, as follows: South, 1.86 meters, north and east, each 1.83 meters.

Adams (Columbia County, C. R., 1878). About three-fourths mile below Columbia City, on a gravelly bank between the county road and the shore, about 45 meters from the shore and 9 meters east of the road, directly opposite Maxwells Landing, and 60 feet above the river level. The station is marked according to note 8.¹ Three cedar stakes are set as follows: North, 1.86 meters, east, 1.83 meters, and south, 1.80 meters. Three copper tacks in a blazed fir tree bear N. 8° 53' E. magnetic, distant 5.5 meters.

Carruthers (Cowlitz County, Wash., C. R., 1878). On a small point of hard clay a short distance above St. Helens. The station is marked according to note 8.¹ Three stakes were set as follows: North, 1.83 meters, east, 1.93 meters, and south, 1.83 meters.

Lemont (Columbia County, C. R., 1878). About one-half mile below St. Helens, on top of a cliff of nearly bare rock, 5.8 meters from the edge, on a small knoll. The station is marked by a drill hole, filled with lead, in the solid rock. Three copper tacks in a triangular blaze on a fir tree bear N. 32° W. magnetic, distant 42.55 meters, and a similar mark on a fir tree bears S. 25° W. magnetic, distant 53.37 meters.

Balsam (Cowlitz County, Wash., C. R., 1878). On the east bank of the Columbia River opposite St. Helens, on a low shore 16 meters from the edge of the water, and 30 meters north of a small creek. The station is marked according to note 8.¹ Three stakes were set as follows: North, 1.81 meters, east, 1.87 meters, and south, 1.81 meters. Three copper tacks in a triangular blaze on a balsam tree bear N. 73° E., distant 2.71 meters, and a similar mark on another balsam tree bears S. 53° E., distant 7.94 meters.

Russell (Cowlitz County, Wash., C. R., 1878). On the east side of the Columbia River, one-half mile below the mouth of the Lewis River, opposite Willamette Slough, on a sand ridge 4 meters from the shore. The station is marked according to note 8.¹ Three stakes were set as follows: North, 1.79 meters, east, 1.80 meters, and south, 1.83 meters. There are three copper tacks in a triangular blaze in a balm tree N. 30.5° E. distant 6.94 meters, and another tree marked in the same way bears S. 80° E., distant 6.82 meters.

¹ See pp. 81 and 82.

Warriors Point (Columbia County, C. R., 1878). On the extreme point of Warriors Point below the break in the bank and immediately in front of Mrs. Taylor's door. The station is marked according to note 8,¹ except that the underground mark is an earthenware bottle. There is a stub with a copper tack in the top, north and another south, both distant 1.83 meters, and one east, distant 1.80 meters.

Lake River (Clarke County, Wash., C. R., 1878). On a low island between Lake and Lewis Rivers, nearly opposite Warriors Point. The station is marked according to note 8.¹ Three fir stakes were set as follows: North, 1.84 meters, east, 1.84 meters, and south, 1.86 meters. Three copper tacks in a triangular blaze on a cottonwood tree bear S. 20° 08' W. magnetic, distant 5.64 meters, and a similar mark on another large cottonwood tree bears S. 76° 40' W. magnetic, distant 4.60 meters.

Shobert (Clarke County, Wash., C. R., 1881). On the east side of Lake River, about 275 meters southeast of Quigleys Landing, on top of a bank 60 feet above the water. The station is marked according to note 8.¹ There are three stakes around the station, as follows: North, 2.36 meters, east, 2.29 meters, and south, 2.13 meters. Three copper tacks in a fir-tree stump bear N. 38° E. magnetic, distant 9.97 meters, and a similar mark on another fir stump bears west magnetic, distant 6.4 meters.

Ladd (Clarke County, Wash., C. R., 1881). In the interior of Bachelor Island, on the first ridge east of a large lake or pond, 16 meters south of an old cattle shed and 120 meters north of a line fence. The station is marked according to note 8.¹ There are 3 cedar stubs around the station as follows: North 1.77 meters, south 1.89 meters, and east 1.73 meters.

Meadows (Columbia County, C. R., 1881). About one-half mile above Mr. Saline's place, on a narrow grass-covered ridge between the slough and swamp, about 100 meters from the shore and 50 meters from the edge of the timber, 16 meters south of a bunch of hard hack and 35 meters north of another bunch. The station is marked according to note 8.¹ There are 3 cedar stubs around the station, as follows: North 1.81 meters, south 1.88 meters, and east 1.84 meters.

Four 2 (U. S. E.) (Clarke County, Wash., U. S. E., 1912). In a small field 21 meters inside the high-water line and 2.4 meters west of a rail fence. The station is marked according to note 1.¹ There is a double cottonwood tree with a nail in a blaze and 2 notches on the tree distant 54.25 meters.

Abrams (Clarke County, Wash., C. R., 1881). On the east side of Lake River about 1½ miles above Quigleys Landing, on a steep side hill just north of a small gulch, about 45 meters southeast of a group of 3 fir trees. The station is marked according to note 8.¹ There are 3 cedar stubs around the station as follows: North 1.83 meters, east 1.96 meters, and south 1.94 meters. There is a triangular blaze on a small oak tree distant 13.33 meters, and a similar mark on a maple tree distant 12.19 meters.

Fales house, red chimney (Clarke County, Wash., C. R., 1881). This is a false chimney of wood, painted bright red.

Nelson (Columbia County, C. R., 1881). On the west side of Willamette Slough, nearly opposite the southern end of Wests Island, 122 meters west of the shore line and the same distance east of the shore of a long narrow pond. The station is marked according to note 8.¹ There are 3 cedar stakes around the station, as follows: North 1.85 meters, south 1.85 meters, and east 1.83 meters.

Cloniger (Multnomah County, C. R., 1881). About 50 meters from the west bank of Willamette Slough on the farm belonging to Mr. Cloniger and 172 paces northeast of his house. The station is marked according to note 8.¹ There were 3 cedar stakes set as follows: North 1.88 meters, south 1.86 meters, and east 1.85 meters.

Knapp (Clarke County, Wash., C. R., 1881). A short distance below Knapps Landing in an open pasture, 26 meters from the shore line. The station is marked according to note 8.¹ There are 3 cedar stakes set as follows: North 1.83 meters, south 1.92 meters, and east 1.82 meters. There is also a cedar stake in an old fence line S. 89° E. magnetic, distant 28.002 meters, and a triangular blaze on a cottonwood tree W. 23° E. magnetic, distant 29.99 meters.

Sherringhousen (Multnomah County, C. R., 1878). On the northwest bank of Willamette Slough about one-half mile below Gosas Landing, 60 meters below Mr. Sherringhousen's hay barn and 7 meters from the edge of the bank. The station is marked according to note 8,¹ except there are two hottles lying on their sides instead of three. Three cedar stakes were set, one each north, east, and south, distant 1.83 meters.

Brookside (Clarke County, Wash., C. R., 1881). On top of a bluff hill on the east side of Lake River, nearly opposite the mouth of Salmon Creek, about 1 mile south of Mr. Knapp's ranch, about 75 meters north of a good stream of water and 150 feet above the river level. The station is marked according to note 8,¹ except only one bottle was buried, pointing to the station, and it is east about 1.8 meters. There are 3 cedar stubs around the station as follows: North 1.85 meters, east 1.80 meters, and south 1.85 meters.

Oak Ridge (Multnomah County, C. R., 1881). In open pasture land on the west side of Oak Island, which is on the west side of Sturgeon Lake in the interior of Sauvies Island nearly opposite Gosas Landing on Willamette Slough. The station is marked according to note 8.¹ There are 3 cedar stakes, as follows: North 1.85 meters, south 1.81 meters, and east 1.85 meters.

Harris (Clarke County, Wash., C. R., 1881). On the east bank of the Columbia River back 34 meters and nearly opposite the landing at Reeder's farm on Sauvies Island, 4 meters south of a fence running back from the shore, 14 meters west of a fence parallel with the shore, and 60 meters from the wooded swamp. The station is marked according to note 8.¹ There are 3 cedar stakes, one each north, south, and east of the station, distant 1.83 meters.

Morgan (Multnomah County, C. R., 1881). On Sauvies Island, on the lower end of the land owned by Mr. Morgan, in a cultivated field 12 meters from the river bank. The station is marked according to note 8,¹ except there is no surface

¹ See pp. 81 and 82.

mark. There are 3 cedar stakes around the station, as follows: North 1.90 meters, south 1.85 meters, and east 1.83 meters; also 3 nails in a blazed cottonwood tree, distant 3.05 meters. A small house by the river bears N. 34° W. magnetic, distant 58 meters and a corner of a barn bears S. 11° W. magnetic, distant 68 meters.

Hendrickson (Clarke County, Wash., C. R., 1881). About 12 meters back from the east bank of the Columbia River, just below Hendrickson Point and exactly opposite the mouth of the Willamette River. The station is marked according to note 8.¹ There are 3 cedar stakes around the station, as follows: North 1.86 meters, south 1.90 meters, and east 1.83 meters, and a triangular blaze on a cottonwood tree N. 29° E. magnetic, distant 12.26 meters.

Howell house, east chimney (Multnomah County, C. R., 1881). About 2 miles above the mouth of the Willamette River on Sauvies Island.

Hillside (Multnomah County, C. R., 1883). On the west side of Willamette Slough, about 1½ miles below the head of Sauvies Island, on a bare hillside, about 75 feet above the bottom lands and 55 feet above the county road. The station is marked according to note 8.¹

Quigley (Multnomah County, C. R., 1883). On the brow of a rather steep hillside, about 150 feet above the bottom lands. The ground back of the station forms a gently sloping bench up the hill. The station is marked according to note 8.¹ There are three cedar stakes around the station, as follows: North 1.86 meters, east 1.83 meters, and south 1.89 meters.

Thistle (Multnomah County, C. R., 1882; 1883). On the west bank of the Willamette River, about 6½ miles from Portland, 15.54 meters from a fence on west side of the Portland-St. Helens road. The station is marked according to note 8.¹ There are three cedar stakes around the station, as follows: North 1.91 meters, west 1.86 meters, and east 1.83 meters.

Mann (Multnomah County, C. R., 1883). On the west side of the Willamette River, 5½ miles below Portland, on sloping ground 30 meters west of the Portland-St. Helens road, and 40 feet above the ordinary river level. The station is marked according to note 8.¹ There are three cedar stakes around the station, as follows: North 1.87 meters, west 1.90 meters, and east 1.83 meters.

Homestead (Multnomah County, C. R., 1883).—Lost.

Crest (Multnomah County, E. E. S., 1913). The station is the flagpole in the center of the observation tower on the highest point in the well-known Council Crest Park, at an elevation of about 1100 feet. The tower is about 40 feet square.

Mills (Multnomah County, E. E. S., 1913). It is the spire of the water tank of the Oregon Planing Mills, near the river, in the northern part of Portland, between Nineteenth and Twentieth Streets and between Vaughn Street and the railroad, about 32 paces from Vaughn Street and 47 paces from Nineteenth Street. The stand is of reinforced concrete, with a platform offering ample room and steady support for a theodolite. The tank is 23.04 meters in circumference.

Federal east wireless (Multnomah County, E. E. S., 1913). The eastern one of the two towers in Lents, about 6 miles southeast of Portland, on a lot at the intersection of the O. W. P. R. R. and Main Street. The towers are 146 meters apart and stand in an east and west line perpendicular to Main Street; the western and nearer one is distant 68.6 meters from Main Street at a point 47.5 meters south of the railroad. The towers are 2 meters square, painted white, and 312 feet high.

Federal west wireless (Multnomah County, E. E. S., 1913). The western one of the two towers described above under Federal east wireless.

Y. M. C. A. east wireless (Multnomah County, E. E. S., 1913). A light steel tower surmounted by a mast on the Y. M. C. A. building, which occupies the end of a block on Taylor Street between Sixth and Seventh Streets. The station is 2.5 meters distant from Sixth Street and 11.1 meters from Taylor Street.

Y. M. C. A. west wireless (Multnomah County, E. E. S., 1913). A light steel tower surmounted by a mast on the Y. M. C. A. building, which occupies the end of the block on Taylor Street between Sixth and Seventh Streets. The station is about 2.5 meters distant from Seventh Street and 13.51 meters from Taylor Street.

COLUMBIA RIVER FROM THE MOUTH OF THE WILLAMETTE RIVER TO CASCADE LOCKS.

PRINCIPAL POINTS.

Shaw (Multnomah County, C. R., 1889). About 35 meters from the head of Haydens Island, 10 meters from the north bank. The station is marked according to note 8.¹ There are three cedar stubs with copper tacks in the tops, as follows: West 1.83 meters, east 1.86 meters, and south 3.67 meters. There are three copper tacks in a blazed balm tree distant 4.83 meters.

Stansbury (Multnomah County, C. R., 1889). About one-half mile east of the Portland & Vancouver Railroad, 180 meters south of the county road, and about 6 meters from the brow of the hill. The station is marked according to note 8,¹ except the surface mark is a section of the center pole. There are three stubs marked with copper tacks—north, south, and east—distant 1.83 meters.

Wintler (Clarke County, Wash., C. R., 1889; 1900). About 3¼ miles above Vancouver, on a side hill, on uncultivated land, 30 meters north of the county road, in a growth of small fir trees. The station is marked according to note 8.¹ Stakes with copper tacks in the top were placed 1.83 meters south, east, and west of the station. There is a triangular blaze on a large tree distant 3.70 meters in azimuth 4° magnetic, and a small fir tree with a similar mark distant 7.50 meters in azimuth 84.5° magnetic.

¹ See pp. 81 and 82.

Lower Point (Multnomah County, C. R., 1889). Lost, 1891.

Hexter (Clarke County, Wash., C. R., 1889, 1900). Just east of a road which runs north from the county road and in the back yard of a house owned by Mr. Isaac F. Fletcher. The station is marked by a hole in a brick 2 feet below the surface and at the surface by a hole in a stone. The following azimuths are given: North gable of barn across river, $41^{\circ} 57' 31''$; chimney Phipps house, $97^{\circ} 40' 31''$; chimney J. M. French's house, $138^{\circ} 16' 51''$; cupola Moseley's house, $274^{\circ} 24' 21''$.

Jungle (Multnomah County, C. R., 1889). Lost, 1900.

Quartermasters wharf (Clarke County, Wash., C. R., 1889). On the upper wharf of the Vancouver Barracks and is marked by a copper nail with 4 others around it. It is 3.96 meters north of the edge of the wharf, 6.34 meters east of the edge, and 6.55 meters west of the edge. The station is probably lost.

Rauer (Multnomah County, C. R., 1889). About $1\frac{1}{2}$ miles below Vancouver, on an island lying abreast of Hayden Island, 4.5 meters from the edge of a vertical bank. The station is marked according to note 8,¹ except the surface mark is a section of the pole projecting 8 inches from the ground. There are 3 stubs around the station, east, west, and south, respectively, distant 1.83 meters.

Sisters Farm (Clarke County, Wash., C. R., 1889). About $1\frac{1}{2}$ miles below Vancouver, close to the edge of the river bank, in a public road, opposite the lower end of a double row of piles, and 24 meters above the house belonging to the Sisters of Providence Academy. The station is marked according to note 8,¹ except the underground mark is a cross on a flat stone. There are 3 stubs with copper tacks in them, each 1.83 meters from the station, one east, one west, and one south.

Allman (Clarke County, Wash., C. R., 1889). About 3 miles below Vancouver, 13 meters north of the river bank. The station is marked according to note 8.¹ There are 3 stubs around the station, distant 1.83 meters, one each north, east, and west.

Hayden (Multnomah County, C. R., 1889). On the north shore of Hayden Island, about 1 mile above the west end. The station is marked according to note 8.¹ There are 3 cedar stubs around the station, distant 1.83 meters south, east, and west. There is a nail in a large blazed willow tree, distant 4.389 meters in azimuth 147° magnetic, and a nail in a small blazed willow tree, distant 4.072 meters in azimuth 259° magnetic.

Hood (Multnomah County, C. R., 1891; 1905). On the northern shore of Government Island, about 70 meters from the river shore. There are no trees within about 100 meters of the station. The station is marked by a rectangular cross on a flat stone 3 feet below the surface, and at the surface by a drill hole in a large basaltic rock around which there is a small pile of stones. The following azimuths are given: Chimney of yellow house across the river, $144^{\circ} 40' 47''$; south gable Love's grist mill, $154^{\circ} 36' 57''$; Fisher's Landing, schoolhouse cupola $251^{\circ} 11' 47''$; west gable post office Fisher's Landing $258^{\circ} 38' 27''$.

Prune Hill (Clarke County, Wash., C. R., 1891; 1905). Near the top of a hill, which is clear of timber and covered with grass, 36 meters southwest of an unoccupied house, and about 100 and 150 meters from two fir trees, the tops of which are in range with the station. The station is marked according to note 8.¹

Mays (Multnomah County, C. R., 1891). Lost.

Taggarts Bluff (Multnomah County, C. R., 1891; 1901). Nearly abreast of the eastern end of Government Island, near the edge of a sandstone cliff which is the river bank, about 40 meters east of the highest point. The station is marked according to note 8,¹ except that the three bottles were not placed around the station. There is a drill hole filled with lead in the side of a large boulder facing the station, distant 2.62 meters in azimuth 289° .

Fisher (Clarke County, Wash., C. R., 1891; 1900). About one-fourth mile west of the wharf at Fishers Landing, 45 meters from the foot of a hill which is covered with boulders and underbrush, 192 meters west of a brook, and 153 meters east of a fence at the edge of the forest, and 11 meters back from the river shore. The station is marked by a puncture at the intersection of the cross lines on a stone buried 3 feet below the surface and at the surface by a drill hole filled with lead in a large basaltic rock. Flat stones with arrows scratched on them were buried 1 foot under the ground at equal angles around the station distant 1.83 meters. The following distances and azimuths from magnetic south are given: Blaze on a cottonwood stump distant 11.38 meters $27^{\circ} 44'$, small blackwood tree distant 52.21 meters $137^{\circ} 47'$, blazed willow tree distant 51.51 meters $266^{\circ} 49'$, and highest point of large boulder distant 41.03 meters $201^{\circ} 16'$.

Harlow (Multnomah County, C. R., 1891; 1905). Opposite the village of Troutdale on the extreme point on top of the high pinnacle of rocks at the summit of the bluffs. The station is marked according to note 8,¹ except that the three bottles around the station are omitted. In the group of rocks to the westward there are two small drill holes filled with lead in the face of the rocks toward the station; one is distant 2.079 meters in azimuth 260° magnetic and the other is distant 2.242 meters in azimuth 186° magnetic.

Daniels (Clarke County, Wash., C. R., 1891; 1905). On top of the high land known as Prune Hill, nearly abreast of the lower end of Ladys Island just east of a prune orchard, about 6 meters from the fence. Four stakes with copper tacks in the tops were set north, south, east, and west of the station, distant 1.83 meters. The station is marked according to note 8.¹

Washougal (Clarke County, Wash., C. R., 1891; 1901). In a cultivated field in front of Granger's store, about 82 meters south of the main road. The station is marked by a bottle with a copper tack in the cork, buried 3 feet, and at the surface by a drill hole, filled with lead, in a large stone. The following azimuths are magnetic: Old Washougal Hall flagstaff, $73^{\circ} 38'$; Surber's house chimney, $131^{\circ} 22'$; Granger's store, middle of door, $154^{\circ} 57'$; schoolhouse cupola, $220^{\circ} 18'$; large oak, distant 300 meters $264^{\circ} 51'$; and crotch of a small double oak distant about 150 meters $304^{\circ} 43'$.

¹ See pp. 81 and 82.

Eagles Bluff (Multnomah County, C. R., 1891; 1900). About $1\frac{1}{4}$ miles east of the Sandy River, about 156 feet above the level of the river on the west corner of a nearly level bench of land on a round projecting point on the hillside above the tracks of the Oregon Railroad & Navigation Co. and back of the second reverse curve east of Sandy Creek. The station is marked according to note 8,¹ except that the three bottles around the station were omitted. The reference marks are drill holes filled with lead in rocks; one is distant 2.40 meters in azimuth 65° magnetic and the other is distant 1.95 meters in azimuth 111° magnetic.

Mount Pleasant (Clarke County, Wash., C. R., 1891). Just below Cape Horn and nearly opposite Rooster Rock, on a level bench of the ridge overlooking Canyon Creek. The station is marked according to note 8.¹ The following magnetic azimuths are given: Lawton's house $56^\circ 24'$, Sampson's house $58^\circ 30'$, Rooster Rock $133^\circ 53'$, Tunnel Rock $181^\circ 55'$, Rocky Butte $245^\circ 12'$.

Remington (Clarke County, Wash., C. R., 1891). The station is marked by a bottle buried 3 feet below the surface.

Government Island (Multnomah County, C. R., 1891).—Lost, 1901.

Quarry (Clarke County, Wash., C. R., 1891; 1901). About $1\frac{1}{4}$ miles above Fishers Landing, on a slope of the hill, 20 meters south of the road and 40 meters from the river bank, 200 meters east of Muirhard's house, and 18 meters from the edge of a small quarry. The station is marked by a drill hole in the solid rock.

Lady's Island (Clarke County, Wash., C. R., 1891; 1900). On the upper end of Lady's Island opposite the village of La Camas, on a level spot a little south of the highest point of a ledge of rocks, 150 meters from the eastern point, and 40 meters from the south side. The station is marked by rectangular cross lines on a flat rock 3 feet below the surface, and at the surface by a drill hole in a large boulder nearly level with the surface.

Brush (Multnomah County, F. M., 1901). On the northeast point of a ridge on a high hill about $1\frac{1}{4}$ miles below Corbett station. A level bench was graded for the signal and this is probably the best indication of the general locality. The station is marked by a wide-mouthed bottle with a glass top secured by a metal screw set 2 feet below the surface. There are 3 witness stubs with copper tacks distant 1.83 meters east, west, and south of the station.

Cliff (Multnomah County, F. M., 1901). On the northeast brush-covered slope about 20 meters from the top of the high rocky cliff back of Rooster Rock, about 20 feet below the top of the cliff. A bench was graded out of the side hill for the signal and this is probably the best guide to the location of the station. The station is marked by a drill hole in a flat stone rounded underside, buried 2 feet below the surface. There are stubs each marked with a copper tack distant 1.83 meters east, west, and south. The following azimuths are given: Tree Cape Horn $228^\circ 55'$, Rock mid-river $233^\circ 37'$, Castle Rock $240^\circ 37'$, sawmill smokestack $264^\circ 39'$, Rooster Rock $130^\circ 48'$.

Grout (Clarke County, Wash., F. M., 1901). On top of the bluff on Mount Pleasant, on the farm of F. H. Grout about 40 meters east of the fence between the Grout and Sampson farms. The station is marked by a drill hole in a round stone 10 inches in diameter buried 2 feet. There is a cross on the side of a stone facing the station, distant 2.62 meters S. $88^\circ 15'$ E. magnetic, a similar mark distant 4.965 meters S. $29^\circ 55'$ E. magnetic, and a cross on the top of a stone, distant 1.640 meters N. $55^\circ 00'$ W. magnetic.

Shepard (Multnomah County, F. M., 1901). At the edge of a prominent rocky bluff about a mile west of Bridal Veil. The station is marked by a drill hole in the rock at the bottom of a crevice some 4 inches below the surface. Three fir trees are blazed; the first is a small tree on the edge of the bluff distant 3.87 meters, the second tree is 12 inches in diameter and marked with two blazes distant 19.29 meters, and the third is about 14 inches in diameter blazed and marked with a triangle of nails and the letters "U. S. C. S." in tacks distant 33.34 meters. The following azimuths are given: Rooster Rock $84^\circ 47' 09''$, tree on high rock $227^\circ 30' 50''$, rock in mid-river $210^\circ 46' 02''$, and Cape Horn tree $174^\circ 13' 23''$.

Mount Zion (Skamania County, Wash., F. M., 1901). On a cone-shaped hill, about 1 mile back from Cape Horn, not on the highest part of the hill but a short distance down the southeast slope. The station is marked by a hole drilled in a stone buried 2 feet, and at the surface is a larger stone with a drill hole 1 inch deep. There are three dead trees blazed, one distant 5.3 meters N. 39° E. magnetic, one distant 11.2 meters S. 44° E. magnetic, and one 11.2 meters S. 15° W. magnetic.

Angel (Multnomah County, F. M., 1901). On a rocky bench, on the crest or backbone of a low brushy ridge, about 1 mile east of Bridal Veil, 400 meters back of a long, low point making out into the river, about 200 meters southeast of the house on Mr. Dalton's place. Back of the station is a prominent bluff called Angel's Rest. The station is marked by a drill hole in the sloping face of the solid rock about 4 inches below the surface. There are 3 reference marks, drill holes in outcropping rock, the distances and magnetic azimuths of which are given; distant 0.85 meter $194^\circ 00'$, distant 3.89 meters $4^\circ 40'$, and distant 1.46 meters $68^\circ 00'$.

Twin Mountain (Skamania County, Wash., F. M., 1901). On the backbone of the brushy ridge leading up to Twin Mountain, about 50 meters above a bare rounded rocky knob. The location is probably best indicated by a level bench that was dug out of the hillside for the signal. The station is marked by a drill hole in a stone buried 1 foot. There is a trunk of a dead fir tree $2\frac{1}{2}$ feet in diameter blazed with three nails driven in it, distant 7.3 meters N. $33^\circ 18'$ E. magnetic, a drill hole in an outcropping rock, distant 3.71 meters N. $6^\circ 36'$ E. magnetic, and a drill in another rock outcrop distant 3.26 meters N. $49^\circ 43'$ W. magnetic. The following magnetic azimuths are given: Castle Rock $230^\circ 00'$, top of Multnomah Falls $287^\circ 16'$, high falls west of Multnomah $307^\circ 45'$, rock in mid-river $20^\circ 20'$.

Railroad (Multnomah County, F. M., 1901). On the north side of the Oregon Railroad & Navigation Company's tracks within the right of way about three-fourths mile east of the 30 mile post, and on a narrow bank about 12 feet above the track. The station is marked by a drill hole in a stone 1 foot below the surface. Two trees are blazed with

¹ See pp. 81 and 82.

nails driven into them, one distant 49.04 meters S. 21° 33' W. magnetic and the other distant 20.18 meters N. 47° 19' W. magnetic.

Oneonta (Multnomah County, F. M., 1901). On a rocky bluff on the west side of Oneonta Gorge. A lone rock in the middle of the river is seen over the outer edge of the cottonwood tree on the first prominent point above Multnomah Falls. The station is marked by a wide mouthed jelly bottle 1 foot below the surface, over which for a surface mark is a stone about 15 inches square with a drill hole in the top. The reference marks are drill holes in rocks, one distant 1.07 meters N. 8° 03' E. magnetic and has the drill hole on the side toward the station, the second is distant 2.51 meters S. 24° 42' E. magnetic and has the drill hole on top, the third has the drill hole on top and is close to the edge of the precipice distant 3.17 meters S. 57° 25' W. magnetic.

Bluff (Skamania County, Wash., F. M., 1901). On the crest of the brushy ridge below the high rocky bluff, opposite the railroad section house at Oneonta, about 100 meters from the talus that has fallen from the cliff. The station is marked by a drill hole in a stone set about 4 inches below the surface. For reference marks there is a blazed stump of a small fir tree distant 5.55 meters N. 74° 46' E. magnetic, a small fir tree blazed with 3 nails distant 16.31 meters S. 82° 34' E. magnetic, a blazed fir tree distant 15.33 meters N. 34° 50' W. magnetic.

Lookout (Skamania County, Wash., F. M., 1901). On a brush covered rounded hill, on a shoulder overlooking the river and Mr. Graaff's residence, directly back of Butlers Landing. The station is marked by a drill hole in a rock 3 or 4 inches below the surface. For reference marks there are 3 drill holes in rocks with the following distances and magnetic bearings: distant 3.57 meters S. 71° 07' E., distant 3.96 meters S. 1° 05' W., distant 2.71 meters S. 25° 41' W.

Dodson (Multnomah County, F. M., 1901). At Dodson's siding on the Oregon Railroad & Navigation Co.'s tracks, about one-half mile above McGowans Cannery, 65.8 meters west of the post marked Dodson's, and 7.86 meters from the north rail of the track. The station is marked by a drill hole in a stone 15 inches below the surface. There are three drill holes in rocks for reference marks, the first is distant 2.12 meters S. 73° 25' E. magnetic, the second is distant 1.97 meters S. 25° 55' W. magnetic, and the third is distant 1.69 meters N. 57° 34' W. magnetic.

Warren (Multnomah County, F. M., 1901). On the north side of the Oregon Railroad & Navigation Co.'s tracks, about 150 meters east of Gorman's large barn and about the same distance west of Dodson's store, and 8.17 meters from the north rail of the track. The station is marked 1½ feet below the ground by a stone with a hole drilled in it, and at the surface by a drill hole in a larger stone. There is a triangle of copper tacks on a telephone pole distant 6.288 meters S. 82° 05' E. magnetic, a fence post with a similar mark is distant 9.42 meters N. 75° 29' W. magnetic, and a second fence post with a similar mark distant 5.96 meters N. 9° 15' W. magnetic.

Climb (Skamania County, Wash., F. M., 1901). On the shoulder of a high rocky bluff on a mountain about due north of Castle Rock. As you climb the ridge above the timber a small shoulder will be reached that gives the first view of the river but the station is on the larger shoulder about 100 feet above. The station is marked by a hole drilled in a small stone surrounded by a triangle buried 10 inches below the surface. There are 3 small stones with crosses cut on them set 1.83 meters from the station, two are on the crest of the ridge one above and one below the station and the other is down the slope on the east side.

Bonneville (Multnomah County, F. M., 1901). On the west side of Tanner Creek, on a steep side hill about 100 meters below the rocky cliff under Potato Hill. A level bench was dug in the side hill for the station. The station is marked by a drill hole in a stone level with the surface of the ground. There is a blazed tree distant 2.04 meters S. 40° 27' E. magnetic and a similar mark distant 2.19 meters S. 0° 22' W. magnetic.

Aldrich (Skamania County, Wash., F. M., 1901). On the summit of a sharp peak directly opposite Bonneville. The station is marked 1 foot underground by a drill hole in a stone. There are three stones with crosses on them 1.83 meters from the station north, east, and south.

Moffat (Skamania County, Wash., F. M., 1901). On the highest point of a comparatively low, bare rocky hill about west of the Cascade Locks, about one-quarter mile from the lake. The station is marked by a drill hole in a stone set 3 or 4 inches below the surface. There is a blazed fir tree 10 inches in diameter distant 19.11 meters N. 46° 34' E. magnetic, and a similar mark on a fir tree 2 feet in diameter distant 9.69 meters S. 52° 59' E. magnetic.

Cascade (Hood River County, F. M., 1901). On the summit of a sharp rocky hill directly back or southeast of the Cascade Locks. The station is on the hill nearest town and the one farthest west of the four hills in this locality. The station is marked by a drill hole in a rock surrounded by a triangle, set about 6 inches below the surface. There is a blazed stump of a fir tree distant 2.00 meters N. 26° 40' W. magnetic, and a blazed fir tree about 4 inches in diameter distant 21.12 meters S. 7° 49' W. magnetic. The following magnetic azimuths are given: southwest end of the rocky bluff near the lake 197° 44', higher of the two hills back of the station 285° 57', right tangent to the little island above Bradfords Island 44° 37', Cascade fish wheel 99° 00'.

End (Hood River County, F. M., 1901). On the top of a bluff at the west end of a rocky hill which is nearly surrounded by a pond or slough, about 3 miles above the Cascade Locks. The station is marked by a drill hole in solid rock covered with a thin coating of soil, over which is a pile of rocks. There is a blazed oak 12 inches in diameter standing near the edge of the precipice distant 20.24 meters N. 25° 21' E. magnetic, a blazed oak tree 18 inches in diameter standing back from the edge in a thicket of small oaks distant 19.29 meters N. 46° 19' E. magnetic, and a small scrub oak at the edge of the thicket distant 10.52 meters S. 78° 13' E. magnetic.

Stackhouse (Skamania County, Wash., F. M., 1901). On the hillside above the ranch house of Mr. Nix and below that of Mr. Stackhouse, about 1½ miles above Stevenson. The station is marked by a hole drilled in a stone 18 inches below the surface. There are 3 blazed fir trees with nails driven in them, the first is distant 18.212 meters N. 56° 00' E.

magnetic, the second is distant 7.961 meters S. $7^{\circ} 01' W.$ magnetic, and the third is distant 11.506 meters S. $50^{\circ} 21' W.$ magnetic.

Bradford (Multnomah County, F. M., 1901). On the point of a high rocky precipice on the west slope and near the brink, about opposite the upper end of Bradfords Island. A bench was excavated in the steep sidehill for the signal. The station is marked by a drill hole in a rock set level with the surface. There is a blazed fir tree 18 inches in diameter on the crest of the ridge at the edge of the precipice distant 4.14 meters N. $30^{\circ} 03' E.$ magnetic, a similar tree and mark distant 10.27 meters S. $62^{\circ} 34' E.$ magnetic, and a small blazed oak on the west side of the slope distant 7.78 meters S. $15^{\circ} 43' E.$ magnetic.

Locks (Hood River County, F. M., 1901). Near the curve of the retaining wall on the eastern side of the upper entrance to the Cascade Locks. The station is marked by a stone with a hole drilled in it, placed 18 inches underground. There are three crosses cut in the top layer of the riprapping of the retaining wall; the first is distant 7.10 meters N. $57^{\circ} 05' E.$ magnetic, the second is distant 4.82 meters S. $82^{\circ} 51' W.$ magnetic, and the third is distant 6.17 meters N. $21^{\circ} 21' W.$ magnetic.

SUPPLEMENTARY POINTS.

Headquarters flagstaff, Vancouver (Clarke County, Wash., C. R., 1881). Masthead of the flagstaff in front of the barracks to the east of the headquarters building.

Garrison flagstaff, Vancouver (Clarke County, Wash., C. R., 1881). Masthead of the flagstaff which stands near the center of the parade grounds in the garrison.

Stenger (Clarke County, Wash., C. R., 1889; 1900). About $4\frac{1}{2}$ miles above Vancouver on property owned by Mr. Stenger. About 30 meters northeast of a clay pit which was being extended in 1900 so that the station would be destroyed in about 2 years. The station is marked according to note 8.¹

Fishers Wharf, southeast pile (Multnomah County, C. R., 1891; 1900). It is the southeast or upper corner pile of Fishers Wharf. It was whitewashed and used as a hydrographic signal.

Bartlett's barn, north gable (Multnomah County, C. R., 1891). Near the north shore of Government Island, about $1\frac{1}{2}$ miles above Fishers Landing, Wash., on Mr. Bartlett's dairy farm.

Gibbons Creek (Clarke County, Wash., C. R., 1891; 1900). About $2\frac{1}{2}$ miles east of Washougal, one-fourth mile south of the county road, 32 meters west of Gibbons Creek, 29 meters north of two immense cottonwood trees, and 52 meters south of a long line fence inclosing the pasture lands. The station is marked according to note 8¹ with the exception that there is no surface mark except a portion of the center pole which was left in the ground.

Williams (Multnomah County, C. R., 1891; 1900). About 1 mile below Vans Landing, in a peach orchard on a steep hillside, about 40 meters S. $50^{\circ} W.$ magnetic of John Williams's house, close to the edge of the bushes, and about 85 feet above the level of the river. The station is marked by a bottle 3 feet below the surface. There are three copper tacks in a large stump distant 4.2 meters S. $84^{\circ} 37' E.$ magnetic. The following azimuths are given: Sandhill fir tree $354^{\circ} 20' 33''$, Sampson's house west gable $237^{\circ} 13' 03''$, Washougal Hall $327^{\circ} 03' 13''$, wharf house south gable $328^{\circ} 13' 28''$.

Corbett (Multnomah County, F. M., 1901). On the sharp ridge of the first little point about 100 meters east of Corbett's railroad station. The station is marked by a drill hole in a stone $2\frac{1}{2}$ feet below the surface. There is a blazed fir tree distant 7.28 meters in azimuth $271^{\circ} 10'$ magnetic, a fir tree with a similar mark distant 6.22 meters in azimuth $345^{\circ} 30'$ magnetic, and a stump with three nails in it distant 3.66 meters in azimuth $225^{\circ} 34'$ magnetic.

THE SECONDARY TRIANGULATION.

PRINCIPAL POINTS.

Roman (Douglas County, O. B. F., 1903; 1908). On the most westerly of the two summits of the highest peak of the Coast Range, known as Roman Nose or Saddle Mountain, situated near the north line of Douglas County about 5 miles southwest of the junction of Wild Cat Creek with the Siuslaw River. It is on the highest point of the summit, about 6 feet from the southern edge of the bluff and 20 feet from the steep part of the slope south of the station. The peak is bare except for a few low shrubs, and has a steep bluff on the south side, and a gentle grassy slope on the north side. The station is marked by $\frac{3}{8}$ -inch copper bolt 3 inches long cemented into a drill hole in a stone 12 by 12 by 24 inches, 18 inches below the surface, set with the axis east and west. The surface mark is an old-type station mark, which is a disk and shank cast in one piece. The disk is about 85 millimeters in diameter and has a polished center surrounded by the raised letters "U. S. C. & G. S." and a raised flange around the edge. This is set in a stone measuring about a foot on each side, with its top flush with the surface. The two reference marks are drill holes in the top of $\frac{3}{8}$ -inch copper bolts, one of which is leaded or cemented into a drill hole in the nearest outcropping of the solid rock 14.760 meters from the station in azimuth $148^{\circ} 06'$, and the other in a projecting boulder 6.775 meters from the station in azimuth $205^{\circ} 33'$. Arrows pointing to the reference marks are cut in the rock near each mark. An old burned stump is about 5 feet from the station in azimuth 232° .

Mary (Benton County, O. B. F., 1903; 1908). On the highest point of the grassy summit of Mary Peak, about south-southwest from Corvallis. The station is marked by a three-eighths inch copper bolt cemented into a drill hole in a flat stone 4 inches thick and 19 inches in diameter, 22 inches below the surface. The surface mark is an old-type station mark which has a polished center surrounded by the raised letters "U. S. C. & G. S." and a raised flange around the edge. This is set in a boulder 16 by 18 by 30 inches, the top of which is flush with the surface of the ground. The

¹ See pp. 81 and 82.

two reference marks are drill holes in the top of three-eighths inch copper bolts cemented in boulders at the following distances and azimuths from the station: 13.77 meters, $326^{\circ} 22'$; and 29.36 meters, $58^{\circ} 11'$.

Table (Lincoln County, J. S. H., 1908). On a flat-topped mountain known locally as White Rock, southeast of Newport, between the Yaquina and Alsea Rivers, on a small knoll running north and south, about 90 meters southwest of the highest point of the southwest ridge, about 365 meters north of a prominent rocky bluff, and 60 meters north of the highest point of the southeast spur. The station is marked according to note 11.¹ One reference mark is distant 8.47 meters in azimuth $43^{\circ} 43'$, and the other 9.49 meters in azimuth $128^{\circ} 29'$.

Cummins (Lincoln County, J. S. H., 1908). On the highest part of the mountain, 20 miles south of Waldport by road and trail. The station is marked by a drill hole $1\frac{1}{2}$ inches deep in a large rock set flush with the surface. One reference mark is a drill hole one-half inch deep in a natural rock projecting about 6 inches a little way down the slope in azimuth $120^{\circ} 42'$, and the other is a drill hole in a large boulder at the south end of the summit in azimuth $33^{\circ} 33'$.

Foulweather (Lincoln County, J. S. H., 1908). A little west of the highest point on Cape Foulweather, about 10 miles north of Newport, in an opening in the timber which can be easily seen from the beach to the south. Two stands were erected from which to occupy this station so as to avoid cutting. The station is marked by a nail in the root of a tree. There is a drill hole one-third inch in diameter and one-half inch deep in a rock about 7 inches square, the top of which is placed 4 inches below the surface, distant 7.26 meters in azimuth about 138° .

Maple (Lane County, J. S. H., 1908). On the first hill about one-fourth mile south of Bald Mountain, on the highest part of the top, and in the center of the ridge. The station is marked according to note 11,¹ except the reference marks are drill holes without the brass bolts. One reference mark is distant 6.36 meters in azimuth $89^{\circ} 19'$, and the other is distant 8.02 meters in azimuth $346^{\circ} 19'$.

Fairview (Lane County, J. S. H., 1908). On the highest part of the mountain about 6 miles northeast of Heceta between Ten Mile Creek and Big Creek. The station is marked according to note 11.¹ One reference mark is distant 8.65 meters in azimuth $198^{\circ} 01'$, and the other is distant 8.21 meters in azimuth $257^{\circ} 45'$.

Cape (Lane County, J. S. H., 1908). On the mountain 13 miles by road and trail north of Florence, about 150 meters east of the timber, and 9 meters south of the highest point which is covered with large boulders. The station is marked according to note 11.¹ One reference mark is on the largest boulder on the point projecting 3 feet above the surface, north 9.44 meters, and the other is in a boulder projecting about $1\frac{1}{2}$ feet, east 8.17 meters.

Dean (Douglas County, J. S. H., 1908). On the north slope of the first prominent knoll about 275 meters east of the timbered summit known as Deer Head Point, about 15 or 18 meters from the highest part of the knoll. The station is marked by an inch drill hole in the center of a long, narrow rock buried 4 inches underground. For reference marks there are two trees with a nail in a triangular blaze; one is N. 23° E., distant 15.316 meters, and the other is S. 68° E., distant 14.249 meters. These bearings are probably magnetic.

Trail (Douglas County, J. S. H., 1908). On the trail between Gardiner and Florence in some very large timber about 5 miles from Gardiner, about 90 meters beyond a cabin which is passed on the right and close to the trail. The station and cabin are on the same side of the trail. The station was in the top of a tree 160 feet tall and was not marked on the ground. There are two reference marks; one is a drill hole in a rock 18 inches below the surface, over which is another rock with a drill hole 2 inches below the surface, distant 41.16 meters in azimuth $87^{\circ} 15'$, and the other reference mark is the same except the lower mark is buried 24 inches and the upper mark 8 inches, distant 37.18 meters in azimuth $181^{\circ} 13'$.

Schooner (Douglas County, J. S. H., 1908). On the south side of the Umpqua River, about three-fourths mile above Reed's cannery, in the timber on the side hill, 12 meters northeast of the highest part of the hill and about 400 feet above the river. The station is marked 14 inches below the surface by a drill hole in a 30-pound rock and 2 inches below the surface by a standard disk station mark set in a 35-pound rock. For reference marks there are three-eighths inch bolts driven into two large trees; one is distant 6.01 meters in azimuth $218^{\circ} 52'$ and the other is distant 16.12 meters in azimuth $303^{\circ} 33'$.

Burn (Douglas County, J. S. H., 1908). On top of a burnt ridge south of Gardiner, 11 meters southeast from the highest part of the hill. The station is marked according to note 11,¹ except there is only one reference mark and that is distant 10.79 meters in azimuth $76^{\circ} 47' 10''$.

Bald (Lincoln County, J. S. H., 1908). On Rocky Point, which is a very sharp and prominent point one-fourth mile south-southwest of Bald Mountain summit. Here the ridge forms a horseshoe, Rocky Point being at the north-west end and Bald Mountain at the other. There is a trail at the foot of the point on the west side which goes over the top and within 15 meters of the station. There is a spring about 275 meters southwest and another one to the east. The station is marked by a standard disk station mark set in a large rock flush with the surface. There is a three-eighth inch drill hole at the intersection of cross lines between the letters "U. S.," on the most western prominent shelf of natural rock distant 9.25 meters in azimuth $181^{\circ} 21'$, and a three-eighth inch drill hole at the intersection of three cross lines on top of a large natural boulder projecting 1 foot on the southwest face of which are the letters "U. S.," inverted, distant 3.24 meters in azimuth $20^{\circ} 14'$.

Iron (Lincoln County, J. S. H., 1908). On a prominent cone-shaped hill about $1\frac{1}{2}$ miles north of Yaquina Light-house, 4.5 meters north of the extreme high point. The hill is timbered about halfway up and the last 100 meters is very steep and covered with loose stones. The station is marked by a standard disk station mark cemented in the natural rock. For one reference mark there is a drill hole in an outcrop of rock distant 8.195 meters in azimuth 95°

¹ See pp. 81 and 82.

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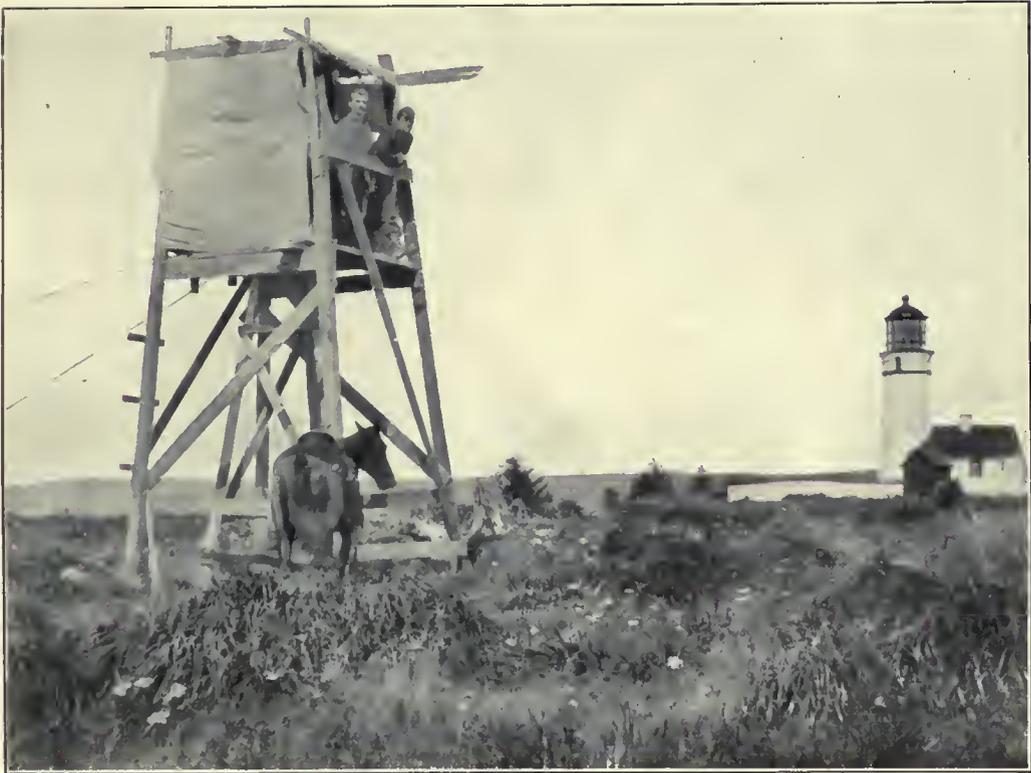


FIG. 4.—STATION CAPE SHOWING THE OBSERVING TOWER WITH THE WIND SHIELD.

19', and the other is a drill hole in the north end of a quite prominent ledge of rock which lies on the backbone of the ridge which extends northward from the summit, distant 18.260 meters in azimuth $172^{\circ} 24'$.

Cascade (Tillamook County, J. S. H., 1908). On the side hill of the southeast ridge of the Cascade Mountain, about 30 meters from the east edge of the timber and 45 meters east-southeast from the top of the first spur. An opening cut through the timber to the north should help to identify the location. The station is marked 2 feet underground by a drill hole at the intersection of cross lines on a flat stone and at the surface by a standard disk station mark set in the end of a large rock. There are four blazed trees marked with nails, as follows: Distant 70.4 meters in azimuth $35^{\circ} 34'$ distant 24.8 meters in azimuth $56^{\circ} 07'$, distant 40.6 meters in azimuth $191^{\circ} 40'$, and distant 43.0 meters in azimuth $288^{\circ} 11'$.

Salmon (Lincoln County, J. S. H., 1908). About 6 miles by road and trail southwest of Otis post office on the highest fern-covered hill on the south side of the entrance to the Salmon River, on top of a ridge 1.5 meters across, 27 meters south of the highest point, and directly in the center of the trail. The station is marked by a bolt 1 inch in diameter set in the top of a large rock flush with the surface. The reference marks are 1-inch drill holes one-half inch deep in natural rocks on the hillside; one is distant 3.40 meters in azimuth $85^{\circ} 54'$ and the other is distant 2.00 meters in azimuth $149^{\circ} 37'$.

Tillamook Head (Clatsop County, J. J. G., 1874). On the highest point of Tillamook Head, near a large, dry hemlock stump with a copper nail in the top distant 0.70 meter, and a copper nail in a stump northwest is distant 3.99 meters. The station is marked by a drill hole in a stone 18 inches below the surface.

Saddle Mountain (Clatsop County, J. J. G., 1874; 1875). Lost.

Neahkahnie (Tillamook County, J. J. G., 1875). On the highest point of the east peak of Neahkahnie Mountain. The station is marked by a drill hole in solid rock, and is best reached from the south face of the mountain.

Foley (Tillamook County, J. J. G., 1875). On the highest part of a well-defined round-topped grass-covered hill 2,000 feet high between the forks of Foley Creek and one of the tributaries of the south branch of the Nehalem. The station is marked by a one-half inch drill hole in a flat stone 4 inches below the surface. A large dead tree marked by an iron nail bears N. 39° W. magnetic distant 6.20 meters.

Crag (Tillamook County, J. J. G., 1875). On a high rocky peak, on the highest part of a ridge running north. The station is marked by a nail hole in a soft rock.

Miami (Tillamook County, J. J. G., 1875). A few feet from the summit of the northeast point of the highest hill northwest from the mouth of the Miami River. The station is marked by a drill hole in a granite block projecting 3 inches above the surface.

Boulder Point (Tillamook County, I. K., 1866; 1908). On the south side of Tillamook Bay on a heavily timbered prominent point, about 1 mile south of Dick Point dike. The station is marked by a drill hole in a 6-inch square rock buried even with the surface. For reference marks there is a drill hole in a triangular rock projecting about 6 inches, distant 13.27 meters, in azimuth $132^{\circ} 12'$, and a drill hole in a large boulder projecting 2 feet, distant 5.00 meters, in azimuth $257^{\circ} 14'$.

Shell Point (Tillamook County, J. J. G., 1866; 1908). On the east side of Tillamook Bay, on the first prominent point above Bay City, commonly known as Goose Point, about 9 meters from the edge of the grass to the south and 5 meters from the grass to the west. The station is marked by a drill hole in a stone 5 inches square firmly set in the ground. There is a half-inch iron pipe set in a block of concrete 1.083 meters east. This is a United States Army Engineers' station. For a reference mark there is a drill hole in a rounding top stone set above the high-water line, distant 11.59 meters in azimuth $177^{\circ} 00'$.

Hebo (Tillamook County, J. S. H., 1908). On a mountain about 3,000 feet high, the highest in the locality, about 27 miles by road south of Tillamook. Approaching from the northwest the station is 4.5 meters to the left of the trail immediately upon reaching the first ridge of the summit. The station is marked 2 feet below the ground by a drill hole in the rock and at the surface by a standard disk station mark set in a flat stone. For reference marks there are drill holes in prominent large rocks; one is distant 6.69 meters in azimuth $67^{\circ} 54'$ and the other is distant 5.82 meters in azimuth $115^{\circ} 09'$.

Buzzard Butte (Tillamook County, J. S. H., 1908). Between two small knolls, which are about 4.5 meters apart on top of Bald Butte, west of Beaver, northwest of Hebo, and about 1 mile east and a little south of Buzzard Butte, 1,450 feet above sea level. The station is marked $1\frac{1}{2}$ feet below the surface by a drill hole in a natural rock and at the surface by a standard disk station mark set in a flat rock. The reference mark is a drill hole in a large rock on the highest part of the summit on a small knoll, projecting 3 inches from the ground and distant 2.38 meters in azimuth $227^{\circ} 30'$.

Ginger (Tillamook County, J. S. H., 1908). About the center of the top on a little knoll on the highest point of a mountain east of Tillamook, on the Trask River road. The station is marked by a standard disk station mark set in a large rock flush with the surface. The reference mark is an inch drill hole 3 inches deep in a very prominent natural rock formation, distant 9.13 meters in azimuth $44^{\circ} 00'$.

White (Douglas County, O. B. F., 1904; 1906). On the highest part of the summit of White Rock, a prominent peak about 15 miles east of Roseburg. The station is marked by a three-eighths-inch copper bolt 3 inches long, cemented into a hole in a large boulder, and directly above the bolt in the same drill hole is cemented an old-type station mark, which is a disk with a polished center surrounded by the raised letters "U. S. C. & G. S." and a raised flange around the edge. A cross in the top of the copper bolt and another in the polished center of the disk mark the station. For

¹ See pp. 81 and 82.

a reference mark there is a drill hole in the top of a three-eighths-inch copper bolt, which is cemented in a large boulder just east of a prominent ledge and 34.44 meters from the station in azimuth $353^{\circ} 11'$.

Onion (Douglas County, O. B. F., 1904; 1906). On the highest part of the bare summit of Onion Springs Mountain, about 1 mile south of Onion Springs, and best reached from Glendalo via Galesville and Gilpatrick's ranch. The station is marked by a three-eighths-inch copper bolt cemented in a drill hole in a rocky ledge, and directly above the bolt and in the same hole is cemented an old-type station mark, which is a disk with a polished center surrounded by the raised letters "U. S. C. & G. S." and a raised flange around the edge. A cross in the top of the bolt and another in the polished center of the disk mark the station. The two reference marks are drill holes in three-eighths-inch copper bolts cemented in drill holes; one in a prominent ledge, distant 24.62 meters from the station in azimuth $91^{\circ} 50'$, and the other in an inconspicuous low boulder at the western edge of the summit and distant 47.22 meters in azimuth $182^{\circ} 47'$.

Camas (Coos County, J. S. H., 1906). On the south point of the high ridge which lies to the westward of Camas Valley, locally known as Kenyon Mountain. The eastern and southeastern slopes near the top are bare of trees, while the ridges to the north and west are heavily timbered. The instrument stand was the stump of a tree, so no station mark could be placed. The reference marks are three-fourth-inch holes drilled 2 inches deep in the ledge of rock to the east of the station; one is distant 22.062 meters in azimuth $277^{\circ} 20' 14''$, and the other is distant 25.540 meters in azimuth $250^{\circ} 07' 05''$, and the distance between the two marks is 11.700 meters. There is a United States Geological Survey station, a three-fourths-inch copper bolt in the northeast root of a lone fir tree, distant 5.982 meters in azimuth $353^{\circ} 46' 14''$.

Boliver (Coos County, J. S. H., 1907). On a high rocky summit some 25 miles by trail, a little south west of Camas Valley post office, and about 20 miles by trail west of West Fork station on the Southern Pacific Railroad. The station is marked by a copper bolt 1 inch in diameter and 6 inches long, placed 6 inches below the surface (an old Geological Survey mark), and a standard disk station mark set in cement in a stone is the surface mark. The reference marks are one-half-inch copper bolts set in cement in large stones, one about 6.1 meters southeasterly and the other about 7.6 meters southwesterly.

Johnson (Coos County, J. S. H., 1906). On the east side of the open summit known as Lookout Rock, on what is known as Johnson Mountain. About 15 meters southeast of a small fir tree with the lower branches trimmed off. Lines were opened on the west side of the summit to stations *Bennett* and *Sugar*. The station is marked by a standard disk station mark set in a large stone. The reference marks are copper bolts one-half inch in diameter set in cement in large stones, one distant 4.56 meters in azimuth $118^{\circ} 24'$ and the other distant 10.81 meters in azimuth $179^{\circ} 22'$.

Bennett (Coos County, J. S. H., 1906). On the highest point of the west summit of Bennetts Butte. The station is marked by a copper bolt set in cement in a drill hole in a stone 10 inches square and 8 inches deep set $2\frac{1}{2}$ feet below the surface, and the surface mark is a standard disk station mark set with cement in a stone. The reference mark is a copper bolt driven in a small fir stump.

Sugar (Coos County, J. S. H., 1906). On a high summit $3\frac{1}{2}$ miles east of Myrtle Point on what is locally known as Sugar Loaf Mountain. The station is marked by a copper bolt set in cement in a stone $2\frac{1}{2}$ feet below the surface, and over this is a standard disk station mark set in concrete. There is a one-half-inch copper bolt driven in a small alder tree, distant 17.41 meters in azimuth $224^{\circ} 24' 05''$, and another in a tree 3 feet above the ground, distant 7.69 meters in azimuth $294^{\circ} 06' 33''$.

Westport (Coos County, J. S. H., 1906). On the highest point of a long, burned ridge, near the north and west edges of a summit covered with snags and second-growth trees. The station is marked by a one-half-inch copper bolt set with cement in a block of wood 10 inches in diameter and 12 inches long set $2\frac{1}{2}$ feet below the surface, above which is a standard disk station mark set in a similar block of wood. There is a one-half-inch copper bolt driven in a snag distant 11.39 meters in azimuth $109^{\circ} 26'$, and a similar mark in a stump distant 19.19 meters in azimuth $259^{\circ} 11'$.

Catheart (Coos County, J. S. H., 1906). On a wooded summit of the same name as the station, about 11 miles east of Marshfield. The station is marked by a one-half-inch copper bolt set in cement in a stone block 10 inches square by 8 inches deep, buried $2\frac{1}{2}$ feet, and directly above this is a standard disk station mark set in a stone 12 inches square by 8 inches deep. The reference marks are one-half-inch copper bolts driven in blazed stumps, one distant 8.05 meters in azimuth $40^{\circ} 04' 04''$, and the other is distant 7.04 meters in azimuth $343^{\circ} 58' 56''$. There is a blazed tree 4.6 meters east of the station. This is an old United States Geological Survey triangulation station.

Noah (Coos County, J. S. H., 1906). On a high summit locally known as Noahs Butte, covered with second-growth timber, about 5 miles a little north of east from Marshfield. The station is marked by a copper bolt set in a cut stone $2\frac{1}{2}$ feet below the surface, and at the surface by a standard disk station mark set in a cut stone. For reference marks there are one-half-inch copper bolts driven in the tops of large stumps, one distant 14.18 meters southwest, and the other distant 12.41 meters south.

Marshfield Hill (Coos County, E. F. D., 1889; 1906). On the brow of the hill just back of Marshfield, about 230 feet above the bay, and about 45 meters north of Nashburg's house. The station is marked by a one-half-inch copper bolt set in a stone buried 3 feet below the surface, and directly above this is a standard disk station mark set in a stone. The reference marks are one-half-inch copper bolts driven in large stumps, one distant 15.22 meters in azimuth $150^{\circ} 16' 45''$, and the other distant 4.68 meters in azimuth $264^{\circ} 23' 17''$.

Cape (Curry County, J. S. H., 1907). Near the middle one of the three most western projecting points of Cape Blanco and close to the fence line which follows the edge of the cliff. The station is marked by an empty cartridge cemented in a drill hole in the rock 2 feet below the surface and directly over it is a standard disk station mark. The



FIG. 5.—STATION BALD SHOWING THE 8-INCH POSITION INSTRUMENT IN PLACE, PROTECTED BY A WIND SHIELD.

reference marks are stones with one-half-inch drill holes in them, one is in the fence line along the cliff in range with the center line of the twin windows on the west side of the first story of the lightkeepers' dwelling, distant 8.56 meters, and the other is in range with the flagpole near the cliff to the north of the station, distant 6.84 meters, and the flagpole is distant 23.23 meters.

Madden (Curry County, J. S. H., 1907). On a heavily timbered butte $1\frac{1}{2}$ miles northeast of Charles Zumwalt's place, on the Langlois-Port Orford stage road, one-half mile north of the Sixes River, about 25 or 30 feet southwest of the highest point of the butte. The station is marked by a cartridge shell set in a rock 8 inches square by 12 inches deep $1\frac{1}{2}$ feet underground, and the surface mark is a standard disk station mark set in a stone flush with the surface. The reference marks are one-half-inch iron bolts driven into triangular blazes on fir trees, one distant 3.53 meters in azimuth $189^{\circ} 31'$, and the other distant 5.83 meters in azimuth $293^{\circ} 38'$.

Butler (Curry County, J. S. H., 1907). On the highest point of the highest isolated peak of Mount Butler. The station is marked by a three-fourths-inch iron bolt with a square head covered with sheet copper, marked with a cross, and the whole cemented into solid rock. There are two reference marks, each one-half-inch round iron set in drill holes in the rock, one distant 2.59 meters in azimuth $222^{\circ} 22'$, and the other distant 8.33 meters in azimuth $276^{\circ} 22'$.

Sizes (Curry County, A. W. C., 1869; 1905). On a high bank south of the Sixes River. The station is marked by a square block of wood with a hole drilled in it and filled with lead and placed 3 feet below the surface, over which is a bottle placed neck down. The surface mark is a standard disk station mark set in concrete. The reference marks are one-half-inch round iron driven into the sides of two small fir tree stumps, one distant 5.38 meters in azimuth $346^{\circ} 50'$, and the other distant 3.48 meters in azimuth $281^{\circ} 07'$.

Heads (Curry County, A. W. C., 1869; 1907). On the northern slope of the hill known as Port Orford Heads, in the center of an open field, about 200 yards south of Jensen's house, and about in range with the west side of the house and Maddens Butte. The station is marked by a $1\frac{1}{2}$ -inch drill hole in a block of stone filled with lead and buried 3 feet below the surface. At the surface is a standard disk station mark set in a stone. The two reference marks are five-eighths-inch drill holes in stones set flush with the surface of the ground, one distant 23.37 meters in azimuth $156^{\circ} 53'$ and the other distant 13.78 meters in azimuth $301^{\circ} 55'$. There is a blazed pine tree east 37.0 meters.

Port Orford Astronomical 2 (Curry County, J. S. H., 1907). On the high point and 12 meters from the edge of the bank, in a north and south fence line. The station is marked by a block of blue sandstone with a hole drilled in the top and filled with lead. The two reference marks are one-half-inch drill holes in blocks of sandstone set flush with the surface, one distant 9.11 meters in azimuth $88^{\circ} 47'$, and the other distant 14.68 meters in azimuth $192^{\circ} 18'$.

Bald (Curry County, J. S. H., 1907). On the highest point of the bare peak of Bald Mountain about 13 miles southeast of Port Orford by wagon road and trail. The station is marked by a three-fourths-inch iron bolt with a square head covered with sheet copper which is marked with a cross. The bolt is cemented into the rock with its top 6 inches below the surface. There is a pile of stones around the hole in the rock. The reference marks are three blazed trees.

Squirrel (Curry County, J. S. H., 1907). On the southwest summit of Bear Camp Ridge, locally known as Squirrel Camp, which lies between the Rogue and Illinois Rivers. The station is about 8 meters southwest of the highest point on the north side of an outcrop marked with a piece of brass one-half inch in diameter with a cross on the top set in rock. There is a piece of brass one-half inch in diameter set in the face of a rock lying on the brow of the hill distant about 14.5 meters in azimuth 111° , and a brass cartridge shell set in stone on the ridge distant about 10.4 meters in azimuth 1° .

Stack (Curry County, J. S. H., 1907). On the highest stack of rocks on what is known as Whiskey Flats. The station is a cartridge cemented in a 1-inch drill hole in a rock which lies between two larger and higher rocks bearing nearly east and west. The reference marks are cartridges cemented in holes in the rock, one distant 5.005 meters in azimuth $148^{\circ} 20'$, and the other distant 7.23 meters in azimuth $245^{\circ} 40'$.

Craggy (Curry County, J. S. H., 1907). On the spur of the highest peak of Craggy Mountains, about 100 yards west of the summit, on the second level bench from the top and 150 feet lower. The station is marked by a one-half inch drill hole in a rock. One reference mark is a $1\frac{1}{2}$ -inch drill hole 1 inch deep, in the bottom of which is a one-half inch drill hole, distant 1.59 meters in azimuth $229^{\circ} 28'$, and the other is a shallow $1\frac{1}{2}$ -inch hole in the top of a large isolated rock, distant 7.40 meters in azimuth $318^{\circ} 22'$.

Bosley (Curry County, J. S. H., 1907). On Bosley Mountain about 5 meters north of the highest point of rock on a level space. The station is marked by a standard disk station mark set in rock. The reference marks are one-half inch holes drilled in prominent rocks, one distant 7.63 meters in azimuth $261^{\circ} 18'$, and the other distant 7.98 meters in azimuth $23^{\circ} 07'$. A short distance south and a little higher than the station is a United States Geological Survey cairn.

Sundown 2 (Curry County, J. S. H., 1907). See the description of *Sundown* and the list of positions for the relation of the two stations. The station is marked by a standard disk station mark set in a stone 10 inches square and 14 inches deep, set level with the surface of the ground. A stone cube 16 inches on an edge with a drill hole in the top was set in the ground distant 6.58 meters in azimuth $77^{\circ} 26'$, and there is a one-half inch drill hole in the top of a rock distant 10.09 meters in azimuth $346^{\circ} 23'$. A fir tree $1\frac{1}{2}$ feet in diameter is marked with a nail in a triangular blaze 6 feet from the ground distant about 24.73 meters in azimuth $229^{\circ} 10'$, and a large wire nail in the root of a fir tree stump is distant 16.895 meters in azimuth $359^{\circ} 22'$.

Grizzly (Curry County, J. S. H., 1907). On a bushy summit of Grizzly Mountain, about 6 miles by trail southeast of Gold Beach. Grizzly Mountain has two peaks probably 90 meters apart and the station is on the highest point of the northern peak. The station is marked by a hole drilled in a stone set 1 foot below the surface, above which is placed

a standard disk station mark set in a stono level with the surfaco. The reference mark is a drill holo in the top of a flat rock set in the top of the ridge south of the station, distant 14.38 meters in azimuth $346^{\circ} 42'$.

Pollywog (Curry County, H. A. S., 1913). On the highest part of the wooded hutte about one-half mile south of Pollywog Butte, on the ridge extending south from Quail Prairie, and lying about 6 miles west of the Red Mountain range. The station is marked according to note 12,¹ with a largo cairn of stones surrounding the mark.

Elk (Curry County, H. A. S., 1913). On the highest part of the well-known Elk Mountain, which stands on the north bank of the Winchuck River, about 8 miles from the mouth. The station is marked by a standard disk station mark set in a hlock of concrete 12 by 12 by 24 inches, and a standard disk reference mark is set in a block of concrete distant 2.599 meters in the direction of Bosley Mountain.

Pack Saddle (Curry County, H. A. S., 1913). On the highest part of Pack Saddle Mountain, a double-peaked mountain about 12 miles by trail from the Winchuck ranger station. The southwestern peak of this mountain is used by the Forest Service as a lookout station. The station is marked according to noto 12,¹ with a standard disk reference mark cemented into a drill holo in the rock, distant 4.049 meters in rango between the station and *Elk*.

High Divide (Del Norte County, Cal., H. A. S., 1913). On the highest part of the western bench of the plateau known as High Divide, about 10 miles east of Smith River Corners, Cal. The station is marked according to note 12,¹ with a cairn of stones huilt 3 feet high over and around the mark. There is a standard disk reference mark set in the highest stone on the hill, almost due west of the station, distant 8.495 meters.

Long Ridge (Del Norte County, Cal., H. A. S., 1913). On the highest part of the mountain known as High Dome. This mountain stands about 12 miles northeast of Gasquets Stage station. The station is marked according to note 12,¹ with a standard disk reference mark cemented into a drill holo in the top of a large square rock in place, distant 6.892 meters, in range between the station and *High Divide*.

Bald Hill (Del Norte County, Cal., H. A. S., 1913). About 1 milo beyond the Bald Hill ranch house on the old Kelsey trail. The station is marked according to note 12,¹ with a standard disk reference mark cemented into a drill holo in the top of a rock in place, distant 4.563 meters west of the station.

Gordon (Del Norte County, Cal., H. A. S., 1913; 1914). On the highest part of the summit of Gordon Creek Mountain, the large mountain standing on the west side of Hurdy Gurdy Creek. The station is marked according to note 12,¹ with a standard disk reference mark cemented in a drill holo in the top of a large rock about 4 feet high, distant 14.417 meters in rango between the station and *Crescent City Lighthouse*.

Child (Del Norte County, Cal., H. A. S., 1913; 1914). On the western end of the highest part of what is known as Child's Hill, about 6 miles south of the well-known Bald Hills. The station is marked according to note 12,¹ with a standard disk referenco mark set in a hlock of concrete 5.040 meters west.

Rattle (Del Norte County, Cal., H. A. S., 1914). On the highest part of Big Rattlesnake Mountain, which lies between Red Mountain and the south branch of the Smith River. The station is marked by a standard disk station mark set in an irregular block with a largo cairn of rocks huilt around it. A standard disk reference mark set in a hlock of concrete is distant 7.90 meters north of the station.

Red Mountain (Del Norte County, Cal., H. A. S., 1913; 1914). About 5 meters north of the highest part of Red Mountain, about 20 miles east of Requa, Cal., on the north hank of the Klamath River. The station is marked according to note 12.¹ A large monument of stone standing 10.760 meters east of the station was used as a reference mark.

Mound (Del Norte County, Cal., H. A. S., 1914). On the small grassy knoll almost duo south and about 100 feet below the summit of the first hill north of the mouth of the Klamath River, on what is known as the Lockwood place. The station is marked by a standard disk station mark set in a hlock of concrete, with a standard disk reference mark set in a pino tree about 3 feet above the ground, distant 12.650 meters north.

Klamath South 2 (Del Norte County, Cal., H. A. S., 1914). On the highest part of the hald hill standing on the south side of the mouth of the Klamath River. The station is marked by a standard disk station mark set in a block of concrete, with a standard disk reference mark cemented into a drill holo in a rock in place, distant 4.280 meters east.

Flint Rock 2 (Del Norte County, Cal., H. A. S., 1914). On the seaward face of the highest point of the large rock about 1 mile below the mouth of the Klamath River. The station is marked by a standard disk station mark set in a block of concrete, with a standard disk reference mark set in a hlock of concrete, distant 3.96 meters east.

Flint Ridge (Del Norte County, Cal., A. W. C., 1872; 1914). On the long sloping ridge back of Flint Rock, about 800 feet in elevation and 50 or 60 meters from the forest edge. The station is marked by a hottle hurried 3 feet below the surface and at the surface by a standard disk station mark set in a hed of concrete.

High Bluff (Del Norte County, Cal., A. W. C., 1871; 1914). On the highest part of the first prominent point south of Flint Rock, about 1 meter from the edge of the hluff, which is the northern face and is almost perpendicular. The station is marked by a standard disk station mark set in a block of concrete surrounded by a largo cairn of stones.

SUPPLEMENTARY POINTS.

Life (Lincoln County, J. S. H., 1908). On top of a high hill about 365 meters from an old life-saving station, 27 meters from a corner of a lookout cahin, and 37 meters from the edge of the bluff. The station is marked according to note 11;¹ one reference mark is distant 8.30 meters in azimuth $47^{\circ} 12'$, and the other is distant 7.35 meters in azimuth $160^{\circ} 52'$.

¹ See pp. 81 and 82.

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FIG. 6.—STATION BOSLEY SHOWING THE TYPE OF TARGET USED FOR THE SHORTER SECONDARY LINES.

Bill (Coos County, J. S. H., 1907). On the highest point of the bare summit known as Bill Peak. The Bandon trail passes at the foot of the summit. The station is marked by a drill hole in a rock 12 inches underground and at the surface by a rock which shows the locality but not the exact spot. One reference mark is a cartridge set in cement in solid rock north 9.10 meters, and the other is a wire nail set in cement in a drill hole in solid rock west 4.63 meters.

Edson (Curry County, J. S. H., 1907; 1909). About 25 meters north of the highest point of Edson Butte. There is a United States Geological Survey station marked by a pile of stones at the summit of the butte. The station is marked by a three-eighth inch iron plug with a punch hole in the top, set in cement in a drill hole in the rock, and standing 2 inches above the surface. The reference mark is a cartridge set in cement in a drill hole in the rock distant 5.16 meters in azimuth $140^{\circ} 51' 31''$.

Cotton (Coos County, J. S. H., 1907). On the southwestern spur of the ridge of which Bennett Butte is the summit, about 7 meters west and a little south of the highest point, midway between two large fir snags, and a few feet south of the line joining them. The station is marked by a three-eighths inch drill hole in the top of a rock set 10 inches below the surface and by a three-eighths inch iron slug set in concrete at the surface of the ground.

Camas U. S. G. S. (Coos County, U. S. G. S., 1907). See the description of Camas.

Bear Mountain (Siskiyou County, Cal., H. A. S., 1914). This is the large rugged individual-looking mountain lying just south of Preston Peak. The top is broad and flat and has several small peaks, none of them rising very high above the summit of the mountain proper.

Preston Peak (Josephine County, H. A. S., 1914). This is the highest mountain of the Siskiyou group. The summit is sharp and the sides are steep. There are several slides and waterfalls on the sea side of the summit, and these make it easy to identify.

Second Peak north of Preston Peak (Josephine County, H. A. S., 1914). This is the second peak north of Preston Peak, along the same ridge. The peak is very sharp and the south slope is steep, looking from a distance as if it were a perpendicular bluff. It resembles Preston Peak in outline and general appearance, but is not so high.

Four Brothers No. 1 (Del Norte County, Cal., H. A. S., 1914). One of the four peaks of Ship Mountain, lying near the southwestern end of the Siskiyou range. They all look alike. They come to a sharp peak and the sides are steep. They lie a little closer to the coast than the balance of the Siskiyou group.

Four Brothers No. 2 (Del Norte County, Cal., H. A. S., 1914). See the description of Four Brothers No. 1.

Four Brothers No. 3 (Del Norte County, Cal., H. A. S., 1914). See the description of Four Brothers No. 1.

Four Brothers No. 4 (Del Norte County, Cal., H. A. S., 1914). See the description of Four Brothers No. 1.

COLUMBIA RIVER TO TILLAMOOK BAY.

PRINCIPAL POINTS.

Redwood (Tillamook County, J. J. G., 1875; 1885). About 2 miles from the point of the sand spit which separates the Nehalem River from the ocean, about 30 meters back from the high-water mark. The station is marked by a drill hole in a stone 2 feet below the surface.

Fishery (Tillamook County, J. J. G., 1875). On the east side of the Nehalem River, 3 miles above the mouth, on Fishery Point. The station is marked by a drill hole in a stone 10 inches below the surface.

Seely (Tillamook County, J. J. G., 1875). Lost.

Landing (Tillamook County, J. J. G., 1875). On Landing Point 120 meters south of some large rocks, about 5 meters back from the high-water mark and 6 feet above it. The station is marked 1 foot below the surface by a drill hole in a rock. There are three stakes around the station each distant 1.83 meters.

Point (Tillamook County, J. J. G., 1875). On the highest part of the sand spit one-third mile from the point, near the mouth of the Nehalem River. The station is marked 2 feet below the surface by a drill hole in a stone. Three stakes were set each distant 1.83 meters from the station.

Keaton (Tillamook County, J. J. G., 1875). The station is marked by a drill hole in a stone 2 feet below the surface and probably is lost.

Carlton (Tillamook County, J. J. G., 1875). On the narrow ridge on top of the tall butte on the shore line at the western slope of the Neah-kah-nie mountain. The butte is bare except on the northern part which is covered with scrubby spruce and grass. The station is 0.9 meter from the edge of the bluff to the west and 28 paces from the point to the north. The station is marked 6 inches below the surface by a drill hole in a rock.

Sherman (Clatsop County, J. J. G., 1874). On the highest knoll of the high sand ridge near the ocean, about 4 miles south of Point Adams. The station is marked 2 feet underground by a drill hole in a stone. There are three stakes around the station, each distant 1.83 meters.

Boom (Clatsop County, J. J. G., 1874). On a sand ridge about 75 meters from the shore and about 80 feet above sea level, about 230 meters north of a fence. The station is marked 2 feet below the surface by a drill hole in a rock. There are three stakes around the station, each distant 1.83 meters.

Morrison (Clatsop County, J. J. G., 1874). On a grassy sand hill which runs the entire length of Clatsop Plains, 41 meters north of a fence, and 60 paces west of another and lower ridge beyond which is a creek. The station is marked $1\frac{1}{2}$ feet below the surface by a drill hole in a stone. Three stakes were placed around the station distant 1.83 meters.

Goodwin (Clatsop County, J. J. G., 1874). On a grassy sand ridge, the second west of Mr. Goodwin's house, 11 meters west of the brow of the hill, and 109 meters south of a fence. The station is marked $1\frac{1}{2}$ feet below the ground

by a drill hole in a stone. Three stakes are set around the station, distant 1.83 meters. Mr. Goodwin's house bears S. 44° 30' E. magnetic, distant 375 meters.

Lake (Clatsop County, J. J. G., 1874). On the high ridge at the ocean beach, 107 paces north of the south boundary of Mr. Goodwin's land, 200 meters southwest of a small lake, and 100 paces back from the high water, and 60 feet above it. The station is marked 2 feet below the surface by a drill hole in a stone. Three stakes were set around the station, each distant 1.83 meters.

Condit (Clatsop County, J. J. G., 1874). On the second sand ridge west of the road, 46 paces south of Mr. Condit's north boundary fence, and 10 paces west from the brow of the hill. The station is marked 2 feet below the surface by a drill hole in a stone. Three stakes are set around the station, each distant 1.83 meters.

Callender (Clatsop County, J. J. G., 1874). On the highest sand hill in the vicinity, 83 meters from the high-water mark, and 75 feet above it, 6 paces west and 20 paces east from the edges of the knoll, and 22 paces from the point of the knoll toward Tillamook Head. The station is marked 2 feet below the surface by a drill hole in a stone. Two stakes are set, one on either side of the station, in a line parallel with the shore, and one at right angles to this line to the east, each distant 1.83 meters.

Gearhart (Clatsop County, J. J. G., 1874). On a sand ridge about one-half mile north of the mouth of Nekanakum Creek, 120 paces back from the shore line, 35 meters N. 60° E. magnetic of a round grassy mound, and 50 feet above high tide. The station is marked 2 feet below the surface by a drill hole in a stone. There are two stakes, one on either side of the station, in a line parallel with the shore, and one stake inshore from the station, each distant 1.83 meters.

Meadow (Clatsop County, J. J. G., 1874). In a long meadow on the ridge nearest the timber, from which it is 100 paces distant, and 430 meters south of a fence. The station is marked 1½ feet below the surface by a drill hole in a rock. Three stakes, one each north, south, and east, are distant 1.83 meters. There is a copper nail in a blazed pine tree S. 8° 30' E. magnetic, distant 93 paces.

Loomis (Clatsop County, J. J. G., 1874). On the east bank of the Nekanakum Creek, 650 meters south of its junction with the Neocoxie Creek, a few meters west of the county road, and 3 meters from the edge of a bluff which is 12 feet high. The station is marked 1½ feet below the surface by a drill hole in a stone. Two stakes are set in a line parallel with the bank and one at right angles inshore, each distant 1.83 meters. Mr. Loomis's residence is distant 285 meters N. 44° E.

Grimes (Clatsop County, J. J. G., 1874). On the peninsula between the ocean and Nekanakum Creek, 870 meters north of a road leading to the beach, 10 meters west of the edge of the pines, 132 meters back from the high-water mark, and 15 feet above the tide. The station is marked 2 feet below the surface by a drill hole in a stone. Two stakes are placed in a line parallel with the beach and one at right angles to this line inshore, each distant 1.83 meters.

Dunce (Clatsop County, J. J. G., 1874). On the rocky shore line between the high-water line and the foot of the bluff, at the most westerly point that can be seen from the Seaside House, 4 meters below the extreme high-water mark, and 6 meters above ordinary high water. The station is marked by a drill hole in the top of a flat boulder flush with the surface.

Rivulet (Clatsop County, J. J. G., 1874). In front of the highest part of the last yellow bluff, 100 meters east of a small stream, 15 paces from the foot of the bluff, and 4 paces from the ordinary high-water mark. The station is marked by a drill hole in the top of a large boulder.

Cliff (Clatsop County, J. J. G., 1874). On the most distant point on Tillamook Head, visible from stations Loomis and Grimes, 1 meter in front of the vertical wall of the cliff, and 8 meters from the ordinary tide line. The station is marked by a drill hole in the top of a large irregular boulder 3 feet high, 4 feet long, and 2 feet wide on top.

Ledge (Clatsop County, J. J. G., 1874). Between the foot of the bluff and the high-water mark. The station is marked by a drill hole in the top of a large boulder.

Islet 1 (Clatsop County, J. J. G., 1874). A rocky island nearest the shore, 150 feet high, and pointed at the top.

Islet 2 (Clatsop County, J. J. G., 1874). It is the second island from the shore and second also in size. It is 120 feet high and pointed at the top.

Pinnacle Rock (Clatsop County, J. J. G., 1874). A tall rock pillar about 30 feet high at the most western point of Tillamook Head, 10 paces from the foot of the cliff, and surrounded by water at high tide. It has a large base, slim body, and is pointed at the top.

Dexter (Clatsop County, J. J. G., 1874). In the deepest part of the bight northeast of Tillamook Head at the point where the Nekanakum Creek approaches nearest to the ocean, on a rocky ridge just back of the driftwood, 13 meters back of the high-water mark, 120 meters west of one fence and 132 meters east of another fence, and 30 paces north of a road. The station is marked by a drill hole in a boulder flush with the surface.

Flagstaff (Clatsop County, J. J. G., 1874). Flagstaff standing near the bathhouse attached to the Seaside House.

Seaside House, cupola (Clatsop County, J. J. G., 1874). Flagstaff on the cupola of Mr. Ben Holliday's hotel, the Seaside House.

Falcon (Tillamook County, J. J. G., 1875). On the southwest part of Cape Falcon, on the highest part of the prairie where it begins to slope to the westward, 4 paces from the edge of the bluff to the south, and 20 paces to the edge at the west. The station is marked 1½ feet below the surface by a drill hole in a stone. Two stakes were set, one on either side of the station, in a line parallel with the southern edge of the bluff and one to the north at right angles to this line, distant 1.83 meters.



FIG. 7.—A POINT ON A ROCKY SECTION OF THE TRAIL BETWEEN RED MOUNTAIN AND RATTLE-SNAKE MOUNTAIN, SHOWING THE PACK ANIMALS.



FIG. 8.—THE TYPE OF COMBINATION SIGNAL AND INSTRUMENT STAND USED BY ONE CHIEF OF PARTY WHERE THE LINES WERE SHORT.

Bend (Tillamook County, J. J. G., 1875). On the south side of the Nehalem River, on a rounding point partly covered with grass. The station is marked 2 feet below the surface by a drill hole in a stone. There are two blazed spruce trees; one bears N. 71° W. (magnetic), distant 9.93 meters, and the other bears N. 55° E. (magnetic), distant 11.73 meters.

TILLAMOOK BAY.

PRINCIPAL POINTS.

Doty (Tillamook County, J. S. H., 1908). On the second small spur, 185 meters from the summit, and the same distance beyond the first prominent spur below the summit, 1,360 feet above the sea level. The station is marked by a standard disk station mark set in a rock projecting 2 inches above the surface. The reference mark is a drill hole at the intersection of cross lines in a rock projecting 3 inches above the surface, distant 2.10 meters in azimuth 110° 57'.

Green Hill 2 (Tillamook County, J. S. H., 1908). On the southeast slope of a hill about 45 meters from the highest part, and below all the prominent trees. The station is marked according to note 11,¹ except the reference marks are nails driven into blazed trees. One reference mark is distant 7.8 meters in azimuth 145° 25' and the other is distant 5.3 meters in azimuth 221° 07'.

Pitcher Point (Tillamook County, J. K., 1866; 1908). A few meters east of the extremity of the last prominent point, approaching from the east, on the south side of Tillamook Bay, about 4 meters northwest of the bluff. The station is marked by a drill hole in a stone, buried on the beach below the high-water mark. There is a large cross cut in the top of a prominent rock distant 2.77 meters in azimuth 202° 27'.

Tillamook Bay, west base (Tillamook County, J. K., 1866). On the northwest side of the bay, about 50 meters north of Killchep Point, and near the high-water mark. The station is marked by a drill hole filled with lead, in a stone 2½ feet long, set with the top level with the surface. Two stones were placed one on either side of the station and in line with it and another at right angles to this line, and a drill hole in the top of each is distant 1.22 meters.

Rocky Point (Curry County, 1866; 1869). Lost.

Mud (Tillamook County, J. K., 1866). On the flats south of the bay, below the high-water mark. The station is marked according to note 10.¹

Slough (Tillamook County, J. K., 1866). Near the edge of a slough, on tide land on the southeast side of Tillamook Bay. The station is marked according to note 10.¹

Tillamook Bay, east base (Tillamook County, J. K., 1866). On the north side of the bay and about 20 meters from the high-water mark, and in front of and about 10 meters distant from Peter Morgan's house. The station is marked by a drill hole filled with lead in a stone 2½ feet long, set with the top level with the surface. Two stones were placed, one on either side of the station and in line with it, and another at right angles with this line, and a drill hole in the top of each is distant 1.22 meters.

Sand 1908 (Tillamook Bay, J. S. H., 1908). On the west edge of the sand spit on the west side of Tillamook Bay. The station is marked by a nail driven in the top of an old log.

Pyramid Rock (Tillamook County, J. S. H., 1908). On the highest point of a large rock, said to be 109 feet high, about 5 miles south of Tillamook bar and 1 mile offshore northwest of Cape Mears Lighthouse. The station is marked by a galvanized-iron pipe 18 inches in diameter and 4 feet long riveted on a brass pipe, which is cemented 1½ feet in the rock. The upper half of the pipe is painted black and the lower half white.

Spit (Tillamook County, J. S. H., 1908). On a sand spit on the west side of Tillamook Bay, marked by a redwood post in the sand and projecting 18 inches.

Stump (Tillamook County, J. K., 1866). On the north bank of the Kilchis River, and is covered at high water. The station is marked according to note 10.¹

Sandstone Point (Tillamook County, J. K., 1866). Lost.

Flat (Tillamook County, J. K., 1866). On the flats, covered at high water, on the west side of Tillamook Bay. The station is marked according to note 10.¹

Memalust Head (Tillamook County, J. K., 1866). Lost.

Sand Hill (Tillamook County, J. K., 1866; 1885). On a prominent sand hill on the west side of Tillamook Bay. The station is marked by a drill hole in a rock.

Bailey Point (Tillamook County, J. K., 1866). On a prominent point about 100 meters south of Bailey's house. The station is marked according to note 10.¹

Green Hill (Tillamook County, J. K., 1866; 1875). Lost.

Brush (Tillamook County, J. K., 1866; 1885). On a high sand hill on the west side of a sand spit, and is marked by a drill hole in a stone.

Middle (Tillamook County, J. K., 1866). On the highest part of a ridge. The station is marked according to note 10.¹

Sand (Tillamook County, J. K., 1866). On the sand spit near the south side of the entrance to Tillamook Bay. The station is marked 3 feet below the surface by a drill hole in a stone.

Log (Tillamook County, J. K., 1866). On the north shore of the bay, near the high-water mark. The station is marked according to note 10.¹

Gap (Tillamook County, J. K., 1866). Lost 1908.

NESTUGGA BAY.

PRINCIPAL POINTS.

Round Top (Tillamook County, J. S. H., 1908). On the highest point of the most prominent bald butte west of Cloverdale, 1,130 feet above high-water mark. The station is marked $1\frac{1}{2}$ feet below the surface by a drill hole in a flat rock and at the surface by a drill hole in a triangular-shaped rock. The reference marks are two blazed snags, one distant 10.9 meters in azimuth $34^{\circ} 50'$, and the other distant 1.40 meters in azimuth $216^{\circ} 35'$.

Flat (Tillamook County, J. S. H., 1908). On the highest part of a low, bare, flat-topped ridge about $3\frac{1}{2}$ miles from Cloverdale. The station is marked by a drill hole in the natural rock 14 inches below the surface; over this is a drill hole in an irregular-shaped rock level with the surface. Three galvanized-iron nails in a blaze in an old snag 5 feet in diameter are distant 3.07 meters in azimuth $23^{\circ} 10'$.

Fletcher (Tillamook County, C. R., 1883; 1908). On the south side of the Little Nestugga River, 35 meters northwest from the highest part of a hill between the river and the road leading to the Grande Rondo Reservation. There is a large hole 3.5 meters west of the station and a blazed tree 37.8 meters southwest. The station is marked 3 feet underground by a copper tack in the cork of a bottle and at the surface by a drill hole in a large rock.

Bozley (Tillamook County, C. R., 1883; 1908). In the middle, east and west, of the northern summit of the highest hill immediately east of the entrance to Nestugga Bay and 39.8 meters east of a fence. The station is marked $2\frac{1}{2}$ feet underground by a copper tack in the cork of a bottle and at the surface by a drill hole 3 inches deep in a large rock. There is a drill hole in a smooth stone on a small knoll directly north, distant 8.115 meters.

Gage B (Tillamook County, J. S. H., 1908). On the east side of a high green hill on the north side of Nestugga Bay, about on line between Bozley and Round Top, 33 meters from the top of the hill. The station is marked by an inch drill hole in a large rock flush with surface. There are three galvanized-iron nails in a blaze in a snag about 12 meters west-southwest magnetic, and another blazed snag bears east-southeast magnetic, distant about 8 meters.

Sheep Hill (Tillamook County, C. R., 1883; 1908). On the top of a bare hill northeast of and overlooking the entrance to Nestugga Bay and about one-half mile from the bay shore, about 70 meters east of the road that runs around the top of the hill. The station is marked 3 feet underground by a copper tack in the cork of a white glass bottle, and the surface mark is a drill hole in a rock filled with lead. There is a small hole at the intersection of cross lines on a circular rock south 7.205 meters, and there are four galvanized nails in a small blazed tree south 54.4 meters.

Fern Hill (Tillamook County, C. R., 1883; 1908). On a high rocky hill covered with spruce, alder, and fern, one-half mile east of the road leading to Grande Ronde Valley. The station is marked 18 inches below the ground by cross lines on a flat rock and at the surface by a drill hole in a rock filled with lead.

Goose (Tillamook County, C. R., 1883). Near the mouth and on the north side of the Little Nestugga River, about 330 meters from the end of a small peninsula and 35 meters from the river shore. The station is marked by a copper tack in the top of a cedar post 2 feet long and 6 inches square.

Craven (Tillamook County, C. R., 1883). On the north side of the Little Nestugga River, on low land 53 meters from the edge of the woods. The station is marked by a copper tack in the top of a cedar post $2\frac{1}{2}$ feet long and 6 inches square, projecting 4 inches above the surface.

Vine Maple (Tillamook County, C. R., 1883). On low ground close to the edge of the woods at the foot of the hill, on a rounded point on the south side of Little Nestugga Bay, about three-fourths mile from the junction with the Big Nestugga Bay. The station is marked 3 feet underground by the cross lines on a flat stone and at the surface by a copper tack in the top of a cedar post 18 inches long by 6 inches in diameter.

Gage (Tillamook County, C. R., 1883). On the north side of Nestugga Bay on tide land, about 150 meters from the mud flats and 30 meters east of a small creek. The station is marked by a copper tack in the top of a redwood stake 3 feet long by 6 inches in diameter.

Grass (Tillamook County, C. R., 1883). On low ground on the north side of Little Nestugga Bay. The station is marked by a copper tack in the top of a cedar post 18 inches long by 6 inches in diameter.

Nestugga (Tillamook County, C. R., 1883). A few meters from the brink of the bluff fronting the entrance to the Nestugga River, about 141 feet above sea level. The station is marked $2\frac{1}{2}$ feet underground by a copper tack in the cork of a bottle and at the surface by a drill hole, filled with lead, in a large rock.

Point (Tillamook County, C. R., 1883). About one-half mile from the point of the sand spit forming the north side of the entrance to Nestugga Bay, and about 90 meters from the sea beach at ordinary high water. The station is marked by a copper tack in a block of fir wood, 3 feet long and 8 inches square, set in the sand.

Shersinger (Tillamook County, C. R., 1883). On the east side of the Nestugga Bay, about 4 meters from the foot of the bluff. The station is marked underground by crosslines on a flat stone and at the surface by a large rock with rectangular crosslines.

Beach (Tillamook County, C. R., 1883). About $1\frac{1}{2}$ miles from the point of the sand spit forming the north side of the entrance to Nestugga Bay, about 90 meters from the sea shore. The station is marked by a copper tack in a cedar post, $2\frac{1}{2}$ feet long and 6 inches in diameter, set in the sand.

Green Bluff (Tillamook County, C. R., 1883). On the east shore of Nestugga Bay, on the rocky beach nearly at the extreme high water line and about 7 meters from the foot of a high green bluff. The station is marked 20 inches

¹ See pp. 81 and 82.

underground by cross lines cut on a flat stone and the same kind of mark was placed level with the surface. There is a cedar stake at the foot of the cliff distant 7.47 meters S. 82° W. magnetic.

Red Rock (Tillamook County, C. R., 1883). On the sharp point at the foot of the red rocky bluff on the extremity of the point forming the south side of the Little Nestugga River at its junction with the Big Nestugga River. The station is marked 8 inches underground by a cross cut in the solid rock and at the surface by a cross cut in a stone.

Talbert (Tillamook County, C. R., 1883). On top of a fern-covered hill, about 200 meters west of the main road from Grande Ronde to Slab Creek. The station is marked 2 feet underground by cross lines on a flat stone and at the surface by a drill hole, filled with lead, in a large rock.

Shortridge (Tillamook County, C. R., 1883). On the brow of a bluff close to the ocean, about three-fourths mile south of the entrance to Nestugga Bay, on the summit of a knoll about 175 meters north of the road from Grande Ronde Reservation. The station is marked 3 feet underground by a copper tack in the cork of a bottle and at the surface by a drill hole in a rock filled with lead.

Faulconer (Tillamook County, C. R., 1883). On the outer edge of a range of hills fronting the ocean beach and about 1½ miles south of the entrance to Nestugga Bay, on a small spur of the hill lower than the summits back of it but projecting more to the seaward than any of the others. The station is marked 2½ feet underground by crosslines on a flat rock and at the surface by a drill hole, filled with lead, in a large rock.

Spruce (Tillamook County, C. R., 1883). On low grassy land on the south side of Little Nestugga Bay. The station is marked 3 feet underground by cross lines on a flat rock and at the surface by a copper tack in a cedar post 18 inches long by 6 inches in diameter.

Alder Point (Tillamook County, C. R., 1883). On the north side of Little Nestugga Bay, on a rounding point between the mud flats and the foot of the hills. The station is marked by a copper tack in a cedar post 2½ feet long and 6 inches in diameter.

Mullaney (Tillamook County, C. R., 1883). On low ground on the east side of the Big Nestugga River, one-half mile above the junction with the Little Nestugga River, about 75 meters from the river bank and 40 meters from the foot of the hills. The station is marked 3 feet underground by a beer bottle with a copper tack in the cork and at the surface by crosslines on a large rock.

Sand Dune (Tillamook County, C. R., 1883). On a sand dune in the middle of the peninsula 1½ miles from the entrance to Nestugga Bay. The station is marked by a copper tack in the top of a cedar post 2½ feet long by 6 inches square.

Buckhorn (Tillamook County, C. R., 1883). On the ocean shore about 1½ miles north of the entrance to Nestugga Bay. The station is marked by a copper tack in a cedar post, 2½ feet long and 6 inches in diameter, set in the sand.

Barnhart (Tillamook County, C. R., 1883). On the rocky beach close to the foot of the bluff on the north side of the point at the junction of the Big and Little Nestugga Rivers. The station is marked 18 inches underground by crosslines on a flat rock and at the surface by crosslines on a large rock.

Horseshoe Dune (Tillamook County, C. R., 1883). The station is marked by a copper tack in the top of a cedar post 3 feet long by 6 inches in diameter.

Hardy Rock (Tillamook County, C. R., 1883). On the ocean shore about 2 miles above the entrance to Nestugga Bay, and 110 meters back from the high water line. The station is marked by a copper tack in the top of a cedar post 2½ feet long and 6 inches in diameter.

Nestugga Bay southeast base (Tillamook County, C. R., 1883). Close to the edge of the shore on the east side of the Nestugga River. The station is marked 3 feet underground by a copper tack in the cork of a bottle and at the surface by a copper tack in a large block of cedar projecting 3 inches above the surface.

Drift (Tillamook County, C. R., 1883). On the ocean shore north of the entrance to Nestugga Bay and 110 meters from the high-water line. The station is marked by a copper tack in the top of a cedar post 2½ feet long by 6 inches in diameter.

Nestugga Bay northwest base (Tillamook County, C. R., 1883). On the east side of the Nestugga River about 2 miles from the entrance and 20 meters from the shore line. The station is marked 3 feet underground by a copper tack in the cork of a bottle and at the surface by a copper tack in a block of cedar projecting 3 inches above the ground. There are 3 cedar stakes, one each north, south, and east of the station.

YAQUINA BAY AND RIVER.

PRINCIPAL POINTS.

Jet (Lincoln County, J. W. M., 1914). Close to the old south jetty, and about 200 meters from the light on the end of the jetty. The station is marked according to note 13.¹ The reference mark is 3.05 meters south (magnetic).

Port (Lincoln County, J. W. M., 1914). On a hill in Newport and just back of Abbey Hotel, in a proposed street. The station is marked according to note 13.¹ The reference mark is 3.05 meters east (magnetic).

Wire (Lincoln County, J. W. M., 1914). On the first sand hill across the bay from Newport, close to the home of Mr. Tracy Davis, and about 150 meters from the old tramway. The station is marked according to note 13.¹ The reference mark is 3.05 meters south (magnetic).

Mack (Lincoln County, J. W. M., 1914). On McLeans Point, about 180 meters east and upstream from Entrance Range rear light, about 7 meters from high water and 4 meters from the bottom of the bluff. The station is marked

¹ See pp. 81 and 82.

by a standard disk station mark set in a pier of concrete resting on solid rock. A standard disk reference mark set in concrete is 2.13 meters north (magnetic).

Yaquina east base (Lincoln County, J. W. M., 1914). On the sand flats across Yaquina Bay from Newport, on what is locally known as Sand Beach, 32 paces from an old tramway, and just at the high-water line. The station is marked according to note 13.¹ The reference mark is 12.80 meters south (magnetic).

Yaquina west base (Lincoln County, J. W. M., 1914). On the sand flats across from Newport, and not far from the old tramway, at the junction with the jetty, a little below the high-water mark. The station is marked according to note 13.¹ The reference mark is 3.05 meters south (magnetic).

Hint (Lincoln County, J. W. M., 1914). On the end of the sand spit which projects off what is locally known as Idaho Point, between the high-water mark and the end of the grass. The station is marked according to note 13.¹ The reference mark is 3.05 meters south (magnetic).

Bend (Lincoln County, J. W. M., 1914). On that part of the bay locally known as Sallies Bend, about 1½ miles from Yaquina, about 1.5 meters from high water, and about 6 meters from the foot of the bluff. The station is marked by a standard disk station mark set in concrete resting on solid rock. There is a standard disk reference mark set in concrete 3.05 meters north (magnetic).

Quill (Lincoln County, J. W. M., 1914). On the end of Coquille Point on the made ground, known as cribbing, and about 15 meters from the foot of the bluff. The station is marked by a standard disk station mark set in the top of a 1-inch galvanized-iron pipe, the whole being set in a bed of concrete. There is a standard disk reference mark set in concrete 6.10 meters east (magnetic) of the station.

Made (Lincoln County, J. W. M., 1914). On the east side of Yaquina Bay about halfway between Yaquina and Coquille Point Light, on made ground known locally as cribbing. It is marked according to note 13,¹ except that the station mark is set in a 1-inch galvanized-iron pipe. The reference mark is 3.05 meters southeast (magnetic).

Case (Lincoln County, J. W. M., 1914). Near the high-water mark, on a point owned by Mrs. Mary Case, about 20 meters north-northeast of her house. The station is marked according to note 13.¹ The reference mark is 3.05 meters south (magnetic).

Yaq (Lincoln County, J. W. M., 1914). In the front yard and about 10 meters northwest of the Yaquina depot, on a line with the bay side of the building. The station is marked by a standard disk station mark set in a 1-inch galvanized-iron pipe, the whole being set in a bed of concrete 9 inches in diameter and 2 feet deep. There is a beer bottle 2½ feet below the surface. There is a standard disk reference mark set in concrete 3.05 meters east (magnetic).

Soft (Lincoln County, J. W. M., 1914). On the mud flats, about 10 meters out from the high-water line, close to a small wharf at West Yaquina. The station is marked by a standard disk station mark set in a 1-inch galvanized-iron pipe 3 feet long, the whole being set in a bed of concrete 8 inches in diameter and 3 feet deep.

Out (Lincoln County, J. W. M., 1914). On the west side of the bay, about one-fourth mile above West Yaquina, on mud flats. The station is marked by a standard disk station mark set in a pier of concrete 8 inches in diameter at the top and 2½ feet deep.

Wise (Lincoln County, J. W. M., 1914). On a sharp, rocky, wooded point, just out from what is locally known as Wisers railroad cut, about 20 feet above high water. The station is marked according to note 13¹ except that the surface mark is set in a 1-inch iron pipe. The reference mark is 3.05 meters north by east (magnetic).

Log (Lincoln County, J. W. M., 1914). On the west side of Yaquina Bay, across and due northwest (magnetic) from Oneatta, about 10 meters from the rock bluff, between the high and low water marks, near a large log. The station is marked by a standard disk station mark set in the top of a 1-inch iron pipe set in concrete which rests on bed rock. There is a standard disk reference mark set in concrete 6.10 meters west (magnetic).

Et (Lincoln County, J. W. M., 1914). On the extreme end of a sharp wooded point, where the Oneatta sawmill was formerly located, just above high water. The station is marked according to note 13,¹ reference mark is 4.69 meters east (magnetic).

Stump (Lincoln County, J. W. M., 1914). About 2 miles below Oysterville, on the south side of the bay, at the beginning of the bend, between high and low water marks, and between two large stumps. The station is marked according to note 13,¹ except the station mark is set in a 1-inch galvanized iron pipe. The reference mark is 4.27 meters south (magnetic).

Water (Lincoln County, J. W. M., 1914). On the mud flats about one-fourth mile up the stream from Oneatta. The station is marked by a standard disk station mark set in a pier of concrete 8 inches in diameter and 3 feet deep.

Mud (Lincoln County, J. W. M., 1914). On the south side of Yaquina Bay, on the mud flats opposite the home of Ed. Harlow. The station is marked according to note 13,¹ except that the surface mark is set in a 1-inch pipe. The reference mark is 6.10 meters south (magnetic).

Road (Lincoln County, J. W. M., 1914). Close alongside the railroad track, being 1.905 meters from the outside rail. The station is marked by a standard disk station mark cemented in a 1-inch galvanized iron pipe, which is set in a cylindrical bed of cement, 8 inches in diameter at the top, 1 foot deep and resting on bed rock. There is a standard disk reference mark set in concrete 3.05 meters east (magnetic).

Caf (Lincoln County, J. W. M., 1914). On the north end of an island known locally as Caffery Island, about 10 meters from the edge of the bluff and 30 feet above high water. The station is marked according to note 13,¹ except the surface mark is set in a 1-inch iron pipe. The reference mark is 3.05 meters south (magnetic).

¹ See pp. 81 and 82.

Rail (Lincoln County, J. W. M., 1914). Directly across the bay from a prominent wooded hill which is on the west side of a small slough, and alongside the railroad, being 1.600 meters from the outside rail, close to the edge of the bluff. The station is marked according to note 13,¹ except that the station mark is set in a 1-inch galvanized iron pipe. The reference mark is 12.19 meters west (magnetic).

Can (Lincoln County, J. W. M., 1914). On the north side of Yaquina Bay at the flag station called Oysterville, opposite Oyster City, about 170 meters east of an old cannery. The station is marked according to note 13.¹ The reference mark is 4.27 meters north (magnetic).

King (Lincoln County, J. W. M., 1914). At the east end of Oyster City, near the high water and close to a large log sunk in the ground. The station is marked according to note 13,¹ except that the surface mark is set in a 1-inch iron pipe. The reference mark is 3.05 meters south (magnetic).

Gravel (Lincoln County, J. W. M., 1914). On a gravel beach at the east end of Oyster City, between the high and low water marks. The station is marked according to note 13,¹ except that the surface mark is set in a 1-inch galvanized iron pipe. The reference mark is 11.58 meters south (magnetic).

Slope (Lincoln County, J. W. M., 1914). Across the river and a little upstream from Oyster City, at the high-water line and about 10 paces from the railroad track. The station is marked according to note 13.¹ The reference mark is 3.05 meters north (magnetic).

Low (Lincoln County, J. W. M., 1914). On the north side of Yaquina Bay, about 900 meters east of Oyster City, on a low point near the railroad track. The station is marked according to note 13.¹ The reference mark is 6.10 meters north (magnetic).

Shell (Lincoln County, J. W. M., 1914). On a mud beach between the high and low water line, in front of a house belonging to Mr. Morgison, near an old wharf, and surrounded by many clam shells. The station is marked according to note 13.¹ The reference mark is 45.72 meters south of the station (magnetic).

Pile (Lincoln County, J. W. M., 1914). The station is a 1-inch drill hole in the top of a pile on the west side of Dr. McIntyre's wharf. A broom stick was stuck in the hole.

Pine (Lincoln County, J. W. M., 1914). On the end of a point locally known as Rocky Point, on the high ground between the railroad and the bay. The station is marked according to note 13,¹ except there is no subsurface mark and the concrete rests on hardpan. The reference mark is 4.88 meters north (magnetic).

Cut (Lincoln County, J. W. M., 1914). On the north side of the bay about 30 feet above high water, between the railroad cut and the bay. The station is marked according to note 13.¹ The reference mark is 3.05 meters north (magnetic).

Clay (Lincoln County, J. W. M., 1914). On the south side of Yaquina Bay, near a channel range and about 50 meters east of the old shipyard. The station is marked according to note 13,¹ except there is no underground mark. The reference mark is 3.05 meters south (magnetic).

Shelf (Lincoln County, J. W. M., 1914). On the north side of Yaquina Bay, between the houses belonging to Jackson and McIntyre, on a shelf of soft rock about 2 feet under water at high water. The station is marked according to note 13.¹ The reference mark is 3.66 meters east (magnetic).

Boone (Lincoln County, J. W. M., 1914). On land owned by the old Boone estate, about 100 meters east of a deep cut, 1.5 meters from the outside rail. The tide flats extend out some distance opposite the station. The station is marked according to note 13.¹ The reference mark is 6.70 meters west (magnetic).

Slue (Lincoln County, J. W. M., 1914). On a marshy point near the water's edge, north of a slough and not far from the old Boone homestead. The station is marked according to note 13.¹ The reference mark is 3.05 meters west (magnetic).

Wharf (Lincoln County, J. W. M., 1914). On the east side of the Yaquina River close to a small wharf near the old Jackson place, between high and low water, in a black muck marsh. The station is marked according to note 13.¹ The reference mark is 53.03 meters east (magnetic).

Ship (Lincoln County, J. W. M., 1914). On the marshy flat between the round point across from Mill 4 railroad station and the small wharf near Mr. Jackson's house. The station is marked according to note 13.¹ The reference mark is 5.49 meters east (magnetic).

Hill (Lincoln County, J. W. M., 1914). At the east end of Boones Slough, not far from the old Boone place, on the side of a hill on the west side of a railroad track, about 30 feet above high water. The station is marked according to note 13.¹ A standard disk reference mark in concrete is 3.66 meters west (magnetic) of the station.

Red (Lincoln County, J. W. M., 1914). Close to a railroad cut, not far from the east end of a trestle, between the track and the bluff. The station is marked according to note 13.¹ The reference mark is 3.05 meters south (magnetic).

Spit (Lincoln County, J. W. M., 1914). On a sand spit which extends southwest from a round point. It is near the round point and bare at about half tide. The station is marked according to note 13.¹ The reference mark is 28.04 meters east (magnetic).

Near (Lincoln County, J. W. M., 1914). On the round point across from Mill 4 railroad station, on the mud beach between high and low water. The station is marked according to note 13.¹ The reference mark is 13.41 meters south (magnetic).

Mill (Lincoln County, J. W. M., 1914). On a grassy marsh at high water. The station is marked according to note 13.¹ The reference mark is 3.66 meters west (magnetic).

¹ See pp. 81 and 82.

Dead (Lincoln County, J. W. M., 1914). On the west end of a large marsh which extends nearly from the Montgomery house to the station, near the high-water line. There are many large dead tree trunks along the shore. It is marked according to note 13.¹ The reference mark is 6.10 meters north (magnetic).

Alder (Lincoln County, J. W. M., 1914). Across the bay and about one-half mile east of Mill 4 railroad station, on a mud point covered with water-logged limbs of trees. The station is marked according to note 13.¹ The reference mark is 3.66 meters south (magnetic).

Soap (Lincoln County, J. W. M., 1914). Across the bay and about one-fourth mile southeast of the old Montgomery place, on a round soapstone point at the high-water mark. The station is marked according to note 13.¹ The reference mark is 2.44 meters south (magnetic).

Grass (Lincoln County, J. W. M., 1914.) Near the middle of the marsh, between the current jetty and Mill 4. The station is marked according to note 13.¹ The reference mark is 5.49 meters north (magnetic).

Apple (Lincoln County, J. W. M., 1914). On the west side of the bay, near an apple tree in front of the old Montgomery place. It is marked according to note 13.¹ The reference mark is 5.49 meters west (magnetic).

Dark (Lincoln County, J. W. M., 1914). On a point covered with alder trees, directly across the bay from the old Montgomery place, a few feet below the high-water mark. The station is marked according to note 13.¹ The reference mark is 6.40 meters east (magnetic).

Field (Lincoln County, J. W. M., 1914). On the east side of the bay, just across from the jetty light, and a few meters south of a cleared field. The station is marked according to note 13.¹ The reference mark is 6.10 meters east (magnetic).

Dune (Lincoln County, J. W. M., 1914). About one-fourth mile north of the Montgomery house, on a pile of sand dumped by dredges about 30 meters from shore. The station is marked according to note 13.¹ The reference mark is 3.05 meters south (magnetic).

Hump (Lincoln County, J. W. M., 1914). About 1½ miles south of Toledo, on the southwest side of the river, about 15 feet above high water, on the top of a small embankment by the railroad. The station is marked according to note 13.¹ The reference mark is 1.52 meters northwest (magnetic).

Dike (Lincoln County, J. W. M., 1914). About 1½ miles south of Toledo, on the northeast side of Yaquina River, about 3 meters from the high-water line, on top of a small dike formed when the river was dredged. The station is marked according to note 13,¹ except that the surface mark is set in a 1-inch iron pipe, and the whole is then set in concrete. The reference mark is 7.92 meters north (magnetic).

Flat (Lincoln County, J. W. M., 1914). About 1 mile south of Toledo, on the tide flats about 64 paces from the high-water mark. The station is marked by a standard disk station mark set in a 1-inch iron pipe 1 foot long, the whole being set in a pier of concrete 10 inches in diameter and 2½ feet deep. There is a standard disk reference mark 3.05 meters east (magnetic).

High (Lincoln County, J. W. M., 1914). On the west side of the river, about 1 mile below Toledo, on a hill just above the railroad tracks, 6 paces back from the railroad fence and 40 feet above the high-water mark. The station is marked according to note 13,¹ except that the surface mark is set in a 1-inch iron pipe. The reference mark is 7.92 meters east (magnetic).

Saw (Lincoln County, J. W. M., 1914). About one-half mile south of Toledo, near an old sawmill and in the yard belonging to Mr. Altery. The station is marked according to note 13.¹ The reference mark is 7.92 meters east (magnetic).

Launch (Lincoln County, J. W. M., 1914). On the tide flats near the Toledo launch works. The station is marked according to note 13.¹ The reference mark is 15.24 meters south (magnetic).

City (Lincoln County, J. W. M., 1914). In the city of Toledo, close to the city dock, also on a line with the extension of the principal street of the city on an embankment about 25 feet above high water, between the railroad track and the river. The station is marked according to note 13.¹ The reference mark is 3.05 meters south (magnetic).

Last (Lincoln County, J. W. M., 1914). About one-fourth mile west of the city dock in Toledo, on a mud dike near the water and about 100 meters southeast of a railroad trestle. The station is marked according to note 13.¹ The reference mark is 7.32 meters south (magnetic).

Sea (Lincoln County, J. W. M., 1914). On a sand knoll on the seacoast about midway between the south jetty and the old life-saving station. The station is marked according to note 13,¹ except there is no reference mark.

Nye (Lincoln County, J. W. M., 1914). Near that part of Newport called Nyo Beach, on a sand hill about 300 meters back from the coast and about one-half mile north of the old Yaquina tower. The station is marked according to note 13,¹ except there is no reference mark.

Shade (Lincoln County, J. W. M., 1914). Across the bay and about southwest from the old Oneatta sawmill, at the high-water mark, and about 6 meters from the foot of the bluff. The station is marked by a 1-inch galvanized iron pipe 1 foot long set in a bed of concrete 2 feet deep, resting on hardpan.

Stream (Lincoln County, J. W. M., 1914). About one-half mile southeast of the Toledo city dock, on the tide flats on the north side of the river. The station is marked according to note 13,¹ except there is no reference mark.

¹ See pp. 81 and 82.

HECETA HEAD TO SIUSLAW RIVER.

PRINCIPAL POINTS.

Spur (Lane County, J. S. H., 1908). On the south side of Siuslaw River, $1\frac{1}{2}$ miles upstream from Florence, on the north slope, and about 90 meters east of the highest point of the ridge. A line of sight was cleared to the south and several to the north and northwest, and these will serve to locate the general locality. The station is marked 15 inches below the surface by a cross marked on the bottom of a bottle and at the surface by a standard disk station mark set in a rock. There is a blazed fir tree, 8 inches in diameter, distant 8.74 meters S. 91° W. magnetic and a blazed willow tree 6 inches in diameter distant 3.29 meters N. 83° E. magnetic.

Cannery Hill (Lane County, L. A. S., 1883; 1908). On a chaparral covered sand hill about 120 meters east of an old cannery and sawmill and near the western edge of the summit. The station is marked by a drill hole in a piece of the backbone of a whale buried 2 feet and at the surface by a standard disk station mark set in a rock. The two reference marks are three-eighths-inch brass bolts cemented in rock. One is west 8.30 meters and the other is north-east 8.24 meters.

Sugar Loaf 2 (Lane County, J. S. H., 1908). On the north side of the river, three-fourths mile east of the outer point, 50 meters back from the top of the bluff, on a round topped sand-hill covered with brush. The station is marked according to note 11.¹ One reference mark is distant 5.32 meters in azimuth $6^{\circ} 06'$ and the other is distant 5.56 meters in azimuth $263^{\circ} 17'$.

Green (Lane County, J. S. H., 1908). About 2 miles north of east of Florence. There is a long ridge of hills about 275 meters east of a road, and it is on the highest part of the one farthest north that the station is located. The station is marked according to note 11.¹ One reference mark is distant 6.80 meters in azimuth $175^{\circ} 35'$ and the other is distant 6.27 meters in azimuth $253^{\circ} 48'$.

Snag (Lane County, J. S. H., 1908). About $2\frac{1}{2}$ miles northeast of Heceta Lighthouse, about 60 meters from the summit of a long sloping bald ridge covered with fern and scattering snags. The station is marked according to note 11.¹ One reference mark is distant 8.03 meters in azimuth $27^{\circ} 39'$ and the other is distant 8.87 meters in azimuth $301^{\circ} 26'$.

Loaf (Lane County, J. S. H., 1908). About 1 mile northeast of Heceta Lighthouse, on a small sand hill covered with brush, about 150 meters south of another sand hill and about 115 meters east of the road. The station is marked according to note 11.¹ One reference mark is distant 5.78 meters in azimuth $286^{\circ} 01'$ and the other is distant 6.81 meters in azimuth $158^{\circ} 26'$.

Plateau (Lane County, J. S. H., 1908). About 4 miles northeast of Heceta Lighthouse, near the southeast corner of a large flat-topped hill, about 15 meters from where it begins to break on the east side. The station is marked according to note 11,¹ except the surface mark is a drill hole in a stone. One reference mark is distant 8.46 meters S. 8° E. magnetic and the other is distant 8.87 meters S. 58° W. magnetic.

Heceta (Lane County, J. S. H., 1908). About one-fourth mile northeast of Heceta Lighthouse, on the highest bald hill in the vicinity, about 6 meters west of the highest point of the hill and about 2 feet lower in elevation. The station is marked according to note 11.¹ One reference mark is distant 7.62 meters in azimuth $52^{\circ} 59'$ and the other is distant 7.02 meters in azimuth $9^{\circ} 54'$.

Turn (Lane County, J. S. H., 1908). On the high bluff about 550 meters southeast of Heceta Lighthouse, on the north slope of the ridge about 8 meters from the top. The station is marked according to note 11.¹ One reference mark is distant 7.19 meters in azimuth $243^{\circ} 18'$ and the other is distant 6.69 meters in azimuth $7^{\circ} 26'$.

Tree (Lane County, J. S. H., 1908). About 900 meters east of Heceta Lighthouse, and 75 meters from the road. The signal was a tree wrapped with cloth and the point sighted upon and located was projected to the ground and is marked 14 inches below the surface by a drill hole in a rock and at the surface by a drill hole in another rock. There is a blazed stump of a snag southeast 3.3 meters, and a blaze on the east side of the signal tree is distant 1.04 meters.

Head (Lane County, J. S. H., 1908). On the south slope of the bald hill 46 meters northeast of Heceta Lighthouse, 2.7 meters east of a fence, 6.1 meters east of the edge of the bluff, and 5.5 meters south of the edge of the bluff. The station is marked according to note 11.¹ One reference mark is distant 7.84 meters in azimuth $38^{\circ} 25'$ and the other is distant 6.64 meters in azimuth $275^{\circ} 13'$.

UMPQUA RIVER.

PRINCIPAL POINTS.

Wind (Douglas County, J. S. H., 1908). On the high sand hill one-half mile northwest of the life-saving station. The station was only marked temporarily by a stake driven in the sand.

Bench (Douglas County, J. S. H., 1908). On a sandstone bluff, 135 meters below the site of the old cannery, and opposite the life-saving station, 9.5 feet above mean low water. The station is marked by a brass bolt set in the sandstone bluff with cement. The letters "U. S. E." and "B. M." are marked in the cement around the station. The station was established by the United States Army Engineers as a reference bench mark for a tide gauge.

Brushy Hill 2 (Douglas County, J. S. H., 1908). On the highest part of a brush-covered hill on the north side of the Umpqua River, and about 4 miles west of Gardiner. The station is marked 3 feet underground by a standard

¹ See pp. 81 and 82.

disk station mark set in stone and at the surface by a drill hole in the end of a large, long rock. For a reference mark there is a drill hole in a rock buried flush with the surface distant 8.72 meters in azimuth $273^{\circ} 31'$.

Cab (Douglas County, J. S. H., 1908). About $1\frac{1}{2}$ miles northwest of the Umpqua Life-Saving Station, 45.7 meters south and 9.1 meters east of the upper life-saving station lookout cabin. The station is marked according to note 11,¹ except there are no reference marks.

Sand hill 2 (Douglas County, J. S. H., 1908). On the westerly slope of the sand hill close to the bank of the Umpqua River, 2 miles upstream from the life-saving station and 1 mile south of Florence stage landing. The station was only marked temporarily by a stake in the sand.

Beach (Douglas County, J. S. H., 1908). On a small knoll on the sand beach about 320 meters north of the mouth of the Umpqua River, and about 1,100 meters west of the life-saving station, and 91 meters east of the lower life-saving station lookout cabin. The station is marked according to note 11,¹ except there are no reference marks.

COOS BAY.

PRINCIPAL POINTS.

Mill (Coos County, J. S. H., 1906). On a prominent hill or bluff in a suburb of Marshfield known as Kittyville, in front of and about 100 meters distant from a large, white house, and northwest of a mill and shipyard. The station is marked by a copper bolt set in a cut stone 3 feet underground and at the surface by a standard disk station mark set in cement in a cut stone. The reference marks are one-half inch copper bolts driven in large stumps, one distant 2.69 meters in azimuth $21^{\circ} 02'$ and the other is distant 10.10 meters in azimuth $128^{\circ} 04' 27''$.

White Point 3 (Coos County, J. S. H., 1906). On the outer extremity of White Point, 2.6 meters from the edge of the point in the direction of Marshfield, 1.4 meters from the edge of the bank to the northward, and 50 meters northwest of Timmerman's house, and 20 feet above high water. The station is marked by a hole drilled in a rock buried 2 feet and at the surface by a standard disk station mark set in a cut stone.

Pierce (Coos County, J. S. L., 1863; 1906). On the top of the bluff on the south side of Pierce Point. The station is marked by a drill hole in a stone buried 1.3 feet below the surface and directly over this is a standard disk station mark set in a stone 12 inches square and 8 inches deep. There is a blazed tree distant 6.45 meters just south of the line to Capt. Dryden's house, and another one inshore of the line to Crawford's house, distant 10.91 meters.

Porter (Coos County, E. F. D., 1889; 1906). On the summit of the knoll just back of the California Lumber Co.'s mill. Large water tanks are located on the north side of the same knoll. The station is marked by a hole drilled in an irregular shaped stone buried $1\frac{1}{2}$ feet and the surface mark is a standard disk station mark set in a stone 12 inches square by 10 inches deep. There is a copper nail driven 1 inch from the top of the largest water tank distant 4.19 meters, and a copper nail in a blazed stump, the only one on the knoll, distant 1.96 meters.

Dewey (Coos County, J. A. L., 1862; 1889). On the top of a small point forming the southern limit of a bight and just back of Dewey Rock. The station is marked by a drill hole in a stone $1\frac{1}{2}$ feet below the surface and by 3 stubs with copper tacks distant 1.83 meters.

Mabry (Coos County, J. S. L., 1862; 1889). On the eastern side of the bay opposite North Bend Point, on a small nearly level spot about 35 feet above high-water mark. The station is marked by a drill hole in a stone $1\frac{1}{2}$ feet below the surface. There is an old pine stump about 3 meters from the station at the edge of the bluff.

North Bend 2 (Coos County, E. F. D., 1889). About 50 meters below the northeast extremity of North Bend Point. The station is marked by a drill hole in a stone. There is a large blazed pine tree 6.77 meters inshore and another one is north 14.95 meters.

Russell (Coos County, J. S. L., 1862; 1889). On top of a bluff forming the eastern point of the entrance to North Slough. The point is covered with timber and heavy underbrush. The station is marked by a drill hole in a stone 1.3 feet below the surface. There is a copper nail in a blazed stump distant 10.29 meters and a stump of the edge of the bluff is distant 2.59 meters.

North Slough 89 (Coos County, E. F. D., 1889). On a low sand spit on the west side of the entrance to North Slough. The station is marked by a drill hole in a stone 3 feet below the surface and at the surface by a wooden block 12 inches square with a copper nail for the station mark. On account of the drifting sand the marking probably is not permanent.

Simpson (Coos County, J. S. L., 1862; 1889). On the top of the bluff on the west end of the point known as North Bend. The station is marked by a drill hole in a rock 1.6 feet below the surface. There are 3 stubs with copper tacks in the top distant 1.83 meters from the station, two are in a line parallel with the top of the bluff and the other is at right angles inshore.

Pony (Coos County, J. S. L., 1862; 1889). On Pony Point on a narrow belt of open ground lying between the high-water mark and the edge of the woods, on a small mound near a very small rivulet. The station is marked by a drill hole in a stone 1.1 feet below the surface. There are 3 stubs with copper tacks distant 1.83 meters.

North Slough (Coos County, J. S. L., 1862).—Lost.

Ridge (Coos County, J. S. L., 1863). On the drifting sand hills of the shore of the bend. The station is marked by a cross on a stone 1.2 feet below the surface; over this is a block of wood with a drill hole to mark the center.

Hutchinson (Coos County, J. S. L., 1862).—Lost.

¹ See pp. 81 and 82.

Tophet (Coos County, J. S. L., 1862; 1863). On the straight shore line south of Pony Point. The station is a hole drilled in the top of a stump 1 meter from the high-water mark.

Henderson (Coos County, J. S. L., 1861; 1863). On the highest of a group of small sand hills forming the northern boundary of the small prairie on which Henderson's house is located. The station is marked by a cross on a flat stone 1.6 feet below the surface. Three stakes set around the station are each distant 1.83 meters.

Cemetery (Coos County, J. S. L., 1861; 1889). Near the first open spot north of the highest part of the bluff. The station is marked by a hole drilled in a stone. There are 3 stubs around the station with copper tacks in the top distant 1.83 meters.

Coos Bay north base (Coos County, J. S. L., 1861; 1863). On the west side of the bay opposite Empire City, 20 paces from the high-water mark. The station is marked by a copper bolt set in a section of a spruce log 3 feet long and 26 inches in diameter, projecting 2 inches above the surface of the ground. There are three stakes around the station each distant 1.83 meters.

Coos Bay south base (Coos County, J. S. L., 1861; 1863). On the west side of the bay on a slight raise in the land belonging to Mr. Henderson. The station is marked by a copper bolt set in a block of wood 3½ feet long 26 inches in diameter set level with the surface. There are three stakes around the station each distant 1.83 meters.

Telegraph (Coos County, J. S. L., 1862; 1863). On the highest part of the bluff immediately north of Empire City. The station is marked by a nail in the bottom of a hole drilled in the top of a stump.

Ridge 2 (Coos County, E. F. D., 1889). About 130 meters from the shore on a timbered ridge about 2.5 meters wide, running northwest and southeast, 275 meters northeast of the old Henderson house, and about 80 feet above the high-water mark. The station is marked by a drill hole in a stone 2 feet below the surface. There is a large pine tree on the eastern slope of the ridge distant 1.63 meters north-northeast and another tree about 1 meter from the edge of the ridge with a similar mark distant 11.48 meters northwest.

Hutchinson 2 (Coos County, E. F. D., 1889). On a small ridge of land at the edge of a marsh. The station is marked by a bottle buried neck down 2½ feet below the surface and over this is a stub with a copper tack to mark the station.

Pest (Coos County, E. F. D., 1889). On the north side of the bay directly opposite Empire City on the highest sand hill in the vicinity about 365 meters back of the pesthouse. The station is marked by a drill hole in a rock 2 feet below the surface.

Empire 2 (Coos County, E. F. D., 1889). Lost.

Midway (Coos County, E. F. D., 1889). On the east side of the bay, about midway between Empire City and Pigeon Point and about 230 meters southwest of Girouni's house at the mouth of Second Creek, on a small sand ridge about 6 meters from the high-water mark and about 12 feet above it. The station is marked by a hole drilled in a stone buried 2 feet below the surface.

Grove (Coos County, E. F. D., 1889; 1909). On the north shore of the bay on the summit of hill at the eastern edge of the first grove of timber above the entrance. The station is marked by a drill hole in a rock 2½ feet below the surface. There is a blazed fir tree marked with a copper tack southwest 12.74 meters, a tree with a similar mark northwest 19.87 meters, and a tree with the same mark south 4.6 meters.

Pigeon 2 (Coos County, E. F. D., 1889; 1909). The station is marked by a bottle buried 3 feet below the surface; over this is a wooden stake with a copper tack.

North Spit (Coos County, E. F. D., 1889). On the southeast extremity of the dry sand spit on the north side of the entrance to the bay, about 25 meters from the high-water mark on the bay side, and about 10 feet above high water. The station is marked by a bottle buried neck down 4 feet below the surface; over this is a cedar stake 4 feet long with a copper tack in the top flush with surface.

Fossil 2 (Coos County, E. F. D., 1889). On the point forming the northeast end of Rocky Point. The station is marked by a drill hole in a rock 3 feet below the surface. There is a large blazed fir tree to the east of the station.

Coos Head 2 (Coos County, E. F. D., 1889). Lost.

Empire 3 (Coos County, J. S. H., 1909). Within 3 paces of the upper edge of the bluff back of the old mill, and about 45 meters to the northeast of a small ravine. This part of the bluff is clear of timber. The station is marked by a pipe driven into the ground and surrounded by concrete.

Jetty (Coos County, J. S. H., 1909). On the jetty on the west side of Coos Bay, about 400 yards below the Government works. The station was not permanently marked.

Ocean (Coos County, J. S. H., 1909). On the sand spit on the west side of Coos Bay, some 200 yards from the ocean. The station was temporarily marked, but no attempt was made to make the mark permanent.

Coos Head 3 (Coos County, J. S. H., 1909). The station is marked by a pipe projecting about 1 foot above the ground. There is a blazed snag 3 feet in diameter with a nail driven in the blaze 5.25 meters south, and a similar blaze and nail on a snag 2½ feet in diameter, distant 5.86 meters east.

Crawford 2 (Coos County, E. F. D., 1889). Lost.

Timmerman (Coos County, E. F. D., 1889; 1890). On the narrow neck of land dividing the bay from Isthmus Slough, about 365 meters southeast of the Methodist church, and about 210 meters east of the Town Site Co.'s office. The station is marked by a drill hole in the end of a brick buried 1½ feet. There is a large blazed fir tree 15.30 meters west.

White Point 2 (Coos County, E. F. D., 1889). Lost.

Isthmus 2 (Coos County, E. F. D., 1889). On the outer extremity of the marshy point forming the north side of the entrance to Isthmus Slough. The station is marked by a drill hole in a stone 2 feet below the surface. There are 3 stakes around the station northwest, southwest, and southeast, distant 1.83 meters.

Marsh (Coos County, E. F. D., 1889). On a low timbered point about halfway between Marshfield and Eastport and about 14 meters from the edge of the hard land. The station is marked by a drill hole in a stone hurried 2 feet. There are 3 stubs with copper tacks distant 1.83 meters from the station, 2 in line and the other at right angles.

Coos (Coos County, J. S. L., 1863; 1889). On the point of marsh dividing Kitchen Slough from Coos River. The station is marked by a drill hole in a stone 1.2 feet below the surface. There are 3 stubs with copper tacks in the top each distant 1.83 meters.

Grass (Coos County, E. F. D., 1889). On the edge of the marsh to the eastward of the high wooded point on the west side of the mouth of Catching Slough and 3 meters south of a small slough running northwest toward the dyke. The station is marked by a drill hole in a stone 1 foot below the surface. There are 3 stakes marked with copper tacks distant 1.83 meters.

Coos River Hill (Coos County, E. F. D., 1889). On the southern edge of the summit of the first hill on the north side of the Coos River, about 2 meters east of a boundary fence running north and south across the hill, and about 400 meters southeast of McIntoshes' house. The station is marked by a drill hole in the end of a brick buried 2 feet. There is a blazed fir tree, 4½ feet in diameter, northeast 15.94 meters, and a small blazed pine tree southeast 11.43 meters.

Loggie (Coos County, E. F. D., 1889). On the first high point on the east side of Catching Slough, on the western slope about 80 feet above the marsh. The station is marked by a drill hole in a stone 1 foot below the surface. There is a blazed stump northwest marked with a copper tack distant 12.446 meters, and a stump with a similar mark is distant 14.304 meters southeast.

Ross (Coos County, E. F. D., 1889). On the slope of the first bare hill on the west side of Catching Slough about 1 mile above its mouth, and on the north side of Ross Slough, about 275 meters south of the Southern Oregon Co.'s water tank, and about 50 feet above tidewater. The station is marked by a drill hole in a stone 1½ feet below the surface with some pieces of brick around the stone. There is a large blazed fir tree with a copper tack to the southward distant 13.20 meters.

Violet (Coos County, J. S. L., 1862; 1889). On a bare green knoll on the northeast side of Pony Point. At the edge of the woods southwest of the station there is a large pine tree blazed and marked with a copper nail distant 28.04 meters. In the direction of the first point up the high on the west side is a depression in the highest part of this point. The center of this depression is distant 12.94 meters.

Branch (Coos County, J. S. L., 1863; 1889). On the first point south of Pony Point, on the west side of Pony Point, distant from the shore line of the marsh 3.9 meters. The largest pine tree in the vicinity is blazed and marked with a copper nail, distant 6.89 meters in a prolongation of the line to Russell Point. The station is probably marked by a drill hole in a stone underground. There are three stubs with copper nails in the top, distant 1.83 meters, one in azimuth 146° 45', the second in azimuth 326° 45', and the third in azimuth 236°.

Haynes (Coos County, J. S. L., 1862; 1889). On a small tongue making off from the bluff on the southeast face of Haynes Point. The station is marked by a drill hole in a stone 1.35 feet below the surface. There is a large blazed pine tree, marked with a copper nail, leaning over the eastern bank, distant 6.42 meters, and a small blazed pine tree on the west bank, distant 2.69 meters.

Charleston 2 (Coos County, E. F. D., 1889). On a bluff at the south side of the entrance to Coos Bay. The station is marked by a bottle buried 2 feet and at the surface by a wooden stake with a copper tack. There is a blazed cedar tree distant 12.5 meters.

Bluff (U. S. E.) (Coos County, U. S. E., 1907). The station is marked according to note 14.¹

Curve (U. S. E.) (Coos County, U. S. E., 1907). The marking of this station is unknown.

Grass Mound (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

Nelson (U. S. E.) (Coos County, U. S. E., 1907). The station is marked according to note 14.¹

Midway Point (U. S. E.) (Coos County, U. S. E., 1907). The station is marked according to note 14.¹

Marsh (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

Empire Dock (U. S. E.) (Coos County, U. S. E., 1907). The marking of this station is not known.

Sand Beach (U. S. E.) (Coos County, U. S. E., 1907.) This station is marked according to note 14.¹

Mabry (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

Lookout Point (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

Jarvis (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

Pony Point (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

Henderson (U. S. E.) (Coos County, U. S. E., 1907). The station is marked according to note 14.¹

Island (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

Hay Barn (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

North Bend (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

Stave Mill (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

Crawford Point (U. S. E.) (Coos County, U. S. E., 1907). This station is marked according to note 14.¹

¹ See pp. 81 and 82.

Barker (Coos County, E. F. D., 1889). On a bluff point on the east side of South Slough, directly opposite the entrance to the bay, about one-half mile south of Rocky Point Jctty, 4 feet from the edge of the bluff, and 50 feet above the tide. The station is marked by a drill hole in a flat stone buried 2 feet below the surface. There is a blazed spruce tree, marked with a copper tack, to the eastward, distant 2.80 meters, and another spruce tree, marked in the same manner, to the northward, distant 5.42 meters.

PORT ORFORD.

PRINCIPAL POINTS.

Arch Rock (Curry County, A. W. C., 1869). On the highest of the rocks composing the Orford Reef, with a large arch running through it from the north to the south, on the eastern face of the rock, on the top of the first bench, 51 feet above sea level. The station is marked by a hole 3 inches square and 3 inches deep drilled in hard rock.

Blanco (Curry County, A. W. C., 1869). Lost.

Bluff (Curry County, A. W. C., 1869). On the edge of the bluff where the curve in the shore line from Cape Blanco joins the main trend. The station is marked by a bottle buried neck down 3 feet below the surface. Three stakes bearing north, south, and west magnetic are distant 1.83 meters.

Port Orford north base (Curry County, A. W. C., 1869). Lost.

West (Curry County, A. W. C., 1869). Lost.

Wilson (Curry County, A. W. C., 1869). Lost.

Rocky Point (Curry County, A. W. C., 1869). Lost.

Best Rock (Curry County, A. W. C., 1869). On the largest of the rocks of Orford Reef, the top of which presents a rounded appearance from all directions. The station is a little to the south of the middle of the rock, 143 feet above sea level, and is marked by a drill hole in the rock 3 inches deep covered with a great cairn of loose stones.

Point Orford Astronomic (Curry County, A. W. C., 1869). Lost.

Round (Curry County, A. W. C., 1869). Lost.

Pine Hill (Curry County, A. W. C., 1869; 1890). On the highest point of the long grassy ridge running from the north end of the lagoon above Port Orford to within one-half mile of Elk River, about midway between the lake and the end of the ridge, and 175 feet above sea level. The station is marked according to note 9,¹ except there is no surface mark. The following magnetic azimuths and distances to blazed trees are given: S. 16° E. 15.0 meters; N. 9° W. 10.30 meters; N. 50° 30' W. 16.12 meters.

Arch Rock Summit (Curry County, A. W. C., 1869). On the summit of the highest of the rocks composing the Orford Reef with a large arch running through it north and south, 149 feet above sea level. The station is marked by a drill hole in the hard rock.

Port Orford south base (Curry County, A. W. C., 1869; 1907). On a large isolated rock, directly at the foot of the trail leading from Port Orford to the west beach, the stream forming the outlet of Garrison Lagoon runs past the south-east side of the rock. The station is in the center of the oblong space, 30 by 60 feet, forming the top of the rock, and is marked by an inverted wine bottle buried 2 feet below the surface, and at the surface by a standard disk station mark.

SAN SEBASTIAN TO CHETKO RIVER.

PRINCIPAL POINTS.

Dolan (Curry County, A. W. C., 1873; 1907). On a high knoll one-half mile south of the point where the road crosses Myers Creek, a little southwest of the highest point of the hill. The station is marked by a stone with a cross on it buried 3 feet and the surface mark is a stone with a 1-inch drill hole set level with the surface. The reference mark is on the highest point except for a mound of earth 6 feet to the north, 2 feet east of the edge of a hole and in range with the station mark and the largest rock on the beach. The reference mark is a one-half-inch drill hole in a rock set level with the surface, distant 8.53 meters in azimuth 262° 15'.

Red Rock (Curry County, A. W. C., 1873; 1907). The station is located in a depression in a large bunch of rocks on a ridge bare on the south side and top, but timbered on the north side, about 3 miles south of the point where the road crosses the Pistol River. The station is marked by a bottle buried 1 foot and at the surface by a stone 12 inches square and 8 inches deep with a drill hole in the top. There is a cross on a flat rock higher than the station, distant 2.99 meters in azimuth 208° 43', a drill hole in the top of a ledge of rock lower than the station, distant 41.462 meters in azimuth 73° 06', and a drill hole in a point of rock distant 3.48 meters in azimuth 207° 51'.

Sundown (Curry County, A. W. C., 1873; 1907). On the western end of a ridge about 3 miles due east of Pistol River, on an open space covered with dead brush, with timber directly to the east. See the description of *Sundown 2* and the list of geographic positions. The station is marked by a glass bottle buried 3 feet below the surface.

Crooks Point (Curry County, A. W. C., 1872). On a bare wind-swept sand hill on the point of land from which Macks Reef starts. Directly opposite the station is a high rock. The station is marked according to note 9,¹ except the surface mark was omitted.

San Sebastian (Curry County, A. W. C., 1873). On the highest point of the long ridge or backbone which forms the main portion of Cape San Sebastian, 30 meters south of a split or gap in the ridge. The station is marked according to note 15.¹ There is a rocky point due north 23 meters and one due south, distant 6 meters.

Cove (Curry County, A. W. C., 1873). On the summit of a hill forming part of a long ridge leading up from Hunter Cove to Cape Sebastian, about opposite Island Rock. The station is marked according to note 15.¹ The station was looked for in 1907 but could not be found.

Cove Island (Curry County, A. W. C., 1873). On the highest part of the large island lying in Hunters Cove. The station is marked according to note 15.¹

Schumaker (Curry County, A. W. C., 1873). On a prominent hill north of Dolan's house and south of the cove. There are a few scattering fir trees on the northern flank of the hill. The station was marked according to note 15.¹

Fairview (Curry County, A. W. C., 1873). Close to the forest edge on the long ridge that runs back from Cape San Sebastian. The station is marked according to note 15.¹

Crooks Hill (Curry County, A. W. C., 1872). On the first mountain south of Pistol River, on the prominent ridge known as Crooks Hill, about midway down the ridge on a prominent isolated bare knoll. The station is marked according to note 9.¹

Bluff (Curry County, A. W. C., 1873; 1907). On the highest part of a very prominent bluff, the sea face of which is a precipice of rock directly opposite the mouth of the Pistol River. The station is marked according to note 15.¹

Loma (Curry County, A. W. C., 1873). On a loma or isolated hill readily picked out from the surrounding hills. The station is marked according to note 15.¹ It is not likely that the station can be recovered.

Pistol River (Curry County, A. W. C., 1873). Near the brow of the hill, on the bluff on the north bank of the Pistol River opposite the prominent old shell mound. The station is marked according to note 15.¹

Crook (Curry County, A. W. C., 1873). On an isolated loma or rounded hill at the right of the point where the trail climbs the bluff after leaving the river. The station is marked according to note 15.¹ It probably can only be recovered by means of other triangulation.

Dune (Curry County, A. W. C., 1873). The station is located on a sand dune and is marked according to note 15.¹

Sand Flower (Curry County, A. W. C., 1873). On a sand dune partially grassed over, north of Crooks Point and about three-fourths of a mile from the rocks off that point. The station is marked according to note 15.¹

Lookout (Curry County, A. W. C., 1873). On the brow of a hill which has a heavy fir forest on the north and a sand slide on the east side. The hill commands a view of the windings of Pistol River. The station is marked according to note 15.¹

Macks Point (Curry County, A. W. C., 1872). On the second point south of Pistol River, the first point south of Crooks Point, directly opposite Macks Rock, about 4.6 meters inland from the bluff. The station is marked according to note 9,¹ except the surface mark was omitted.

Ridge Knob (Curry County, A. W. C., 1872). About one-fourth mile from the beach on the first prominent knoll bare of timber, on the highest part of the knoll. The station is marked according to note 9.¹

Snodgrass (Curry County, A. W. C., 1872). On top of a bare hill which is west of the Snodgrass house, very near to the steep western face. The station is marked according to note 9.¹

Rocky Prairie (Curry County, A. W. C., 1872). On the highest part of a hill which is covered with low brush on the north side, and has a small slide of red earth on the south. It is the only hill in the vicinity commanding a view of the coast line and up and down the country. The station is marked according to note 9.¹

Burnt Point (Curry County, A. W. C., 1872). On the first prominent point below the now deserted Hous-ta-nat-na Indian village, on the highest point to the seaward of two peculiar round hills. The station is marked according to note 9.¹

Smith Hill (Curry County, A. W. C., 1871; 1872). On the highest part of the hill rising directly behind Smith's house, 717 feet above sea level. The station is marked according to note 9.¹

Bush Mound (Curry County, A. W. C., 1872). On the highest point of the hill to the west of the point where the coast trail enters the timber. The hill is rocky and bare on the seaward side but covered with timber on the opposite side. The station is marked according to note 9.¹

Red Mound (Curry County, A. W. C., 1872). On a range of hills about 2½ miles from the coast, on the center and the highest part of the prominent mountain that shows reddish color from the sandstone on its surface. The station is marked according to note 9.¹

Bellevue (Curry County, A. W. C., 1871; 1872). On top of the high hill rising out of the plateau above Cresswell's, west of the trail running over the mountain to Rogue River. The station is marked 3 feet below the surface by a glass bottle and at the surface by a drill hole filled with lead in a stone block. Three stakes each 0.91 meter distant bear north, south, and east magnetic.

Sister Knob (Curry County, J. J. G., 1871; 1872). In the center of the eastern one of the two remarkable conical hills 385 feet above sea level. The station is marked 3 feet below the surface by a bottle and at the surface by a drill hole filled with lead in a stone block. Three stakes bear north, east, and south (magnetic) distant 0.91 meter.

Black Mound (Curry County, A. W. C., 1872). On the first prominent mountain of the range north of the Chetco River, about 6 meters south of the trail that leads over the mountain top. The station is marked 2 feet underground by a glass bottle and at the surface by a drill hole filled with lead in a rough stone. There are three redwood stakes, one each north, south, and east magnetic.

High Mound (Curry County, A. W. C., 1870). On a high mound about 2 miles north of the Chetco River, directly opposite the island rock, known as Whales Head. The sea face of the mound is perpendicular and the mound itself is

¹ See pp. 81 and 82.

220 feet above the highwater mark. The station is marked according to note 15,¹ except there is as a surface mark a stone block with a drill hole in the center filled with lead.

Miller (Curry County, A. W. C., 1870). On the long ridge coming down on the north side of the Chetko River, directly in the trail leading up the face of the ridge, 640 feet above sea level. The station is marked according to note 15.¹

New (Curry County, A. W. C., 1872). On the highest part of the ridge, on the right of the trail from Whales Head to Tommys Creek, and about 300 meters from the deep canyon of Tommys Creek. The station is marked according to note 9,¹ except the surface mark is missing.

Head Island (Curry County, A. W. C., 1871). On the highest point of the seaward one of the two large islands lying off Whales Head, 123 feet above sea level. The station is marked according to note 9,¹ except there is no surface mark.

Trail (Curry County, A. W. C., 1871). Close to the trail on the righthand side just at the point where it commences to descend toward Whales Head. The locality probably can be determined from the stumps left from opening the lines of sight. The station is marked according to note 9,¹ except there is no surface mark.

Sand Hill (Curry County, A. W. C., 1871). On the high hill forming the end of the long ridge making down beyond Bellevue, 497 feet above sea level. The station is marked according to note 9,¹ except there is no surface mark.

Cresswell (Curry County, A. W. C., 1871). Very near the edge of the bluff beyond Cresswell's house. The station is marked according to note 9,¹ except there is no surface mark.

Barnacle Rock (Curry County, A. W. C., 1871). On a flat rock northeast of a high conical rock directly off Sand Hill. The only mark is a hole cut in the rock for the foot of the center pole.

Elk (Curry County, A. W. C., 1872). On the highest part of a small conical hill on the face of the ridge. The station is marked according to note 9.¹

Thomas Hill (Curry County, A. W. C., 1872). On the highest point of the hill bare of timber and is marked according to note 9,¹ except the surface mark was omitted.

Deep Gulch (Curry County, A. W. C., 1872). On the extreme apex of a conical-shaped hill on the end of a very prominent point projecting into the sea, at the extreme end of the beach beyond Tommys Hill. The station is marked according to note 9,¹ except the surface mark was omitted.

Green Hill (Curry County, A. W. C., 1871). On a conical hill in the center of the plateau to the west of the stream making into the coast at Whales Head, 679 feet above sea level. The station is marked according to note 9,¹ except there is no surface mark.

Seal Point (Curry County, A. W. C., 1872). On the highest part of a hill on a point about 1 mile north of Deep Gulch. It is the first hill north of a curious little basin surrounded by precipices. The station is marked according to note 9,¹ except the surface mark was omitted.

Thomas Point (Curry County, A. W. C., 1872). On the highest part of the point projecting the farthest toward the sea. The station is marked according to note 9,¹ except the surface mark was omitted.

Red Bush (Curry County, A. W. C., 1871). In the center of a knoll that rises out of the flat bench or plateau, 354 feet above sea level. The station is marked according to note 9,¹ except there is no surface mark.

Lone Knob (Curry County, A. W. C., 1871). On a peculiar round hill on the plateau above Lone Ranch and 400 feet above sea level. The station is marked according to note 9,¹ except there is no surface mark.

Sandy Point (Curry County, A. W. C., 1871). On top of a long sandy slide in the bank to the left of the point where the trail goes down to Lone Ranch. The station is marked according to note 9,¹ except there is no surface mark.

Acorn (Curry County, A. W. C., 1871). Northeast of Sister Knob on a round hill near the forest. The station is marked according to note 9,¹ except there is no surface mark.

Black Point (Curry County, A. W. C., 1871). On a low point covered with black bushes, near the bluff and about 190 feet above sea level. The station is marked according to note 15.¹

Bench (Curry County, A. W. C., 1871). On the bank of the next stream beyond Flat Knoll, to the right of where the road runs down into the gulch, 290 feet above sea level. The station is marked according to note 9,¹ except there is no surface mark.

Flat Knoll (Curry County, A. W. C., 1871). In the center of a knoll on top of the prominent hill beyond the little creek that the trail crosses beyond Low Point and 203 feet above mean low water. The station is marked according to note 9,¹ except there is no surface mark.

Low Point (Curry County, A. W. C., 1871). On the next prominent point beyond High Mound and beyond where the trail turns off to go to Lone Ranch, near the edge of the bluff, 158 feet above sea level. The station is marked according to note 9,¹ except there is no surface mark.

Taylor (Curry County, A. W. C., 1871). On a rounded hill near the coast, west of the trail after it crosses the little stream where there is a little farmhouse and cattle yard. The station is marked according to note 9,¹ except there is no surface mark.

Hidden (Curry County, A. W. C., 1871). Northeast of High Mound, near the edge of the forest, behind several stony hills, and 350 feet above sea level. The station is marked according to note 9,¹ except there is no surface mark.

Loma (Curry County, A. W. C., 1870). On a peculiar mound-shaped hill covered with small bushes about halfway between the trail and the forest-covered ridge beyond. The station is marked according to note 15.¹

¹ See pp. 81 and 82.

CHETKO RIVER TO TRINIDAD HEAD.

PRINCIPAL POINTS.

North Chetko (Curry County, A. W. C., 1870). On a long point ending in rugged rocks north of the Chetko River. A trail leads from Mr. Miller's house toward the station, but in order to reach the station it will be necessary to descend to the beach and then again mount the rocks. The station is marked according to note 15,¹ except there is as a surface mark a roughly squared stone block with a drill hole filled with lead in the top.

Red Point (Curry County, A. W. C., 1870). About 20 meters from the edge of the bluff bank of a point, which shows red when seen from below, on the farm of Mr. Cooley and nearly opposite his house. The station is marked according to note 15,¹ except that it has as a surface mark a roughly squared stone block with a drill hole filled with lead.

Fence (Curry County, A. W. C., 1870). On Miller's farm about 55 meters west of the northeast corner of the orchard fence on a bench about 160 feet above the sea. The station is marked according to note 15.¹

Cooley (Curry County, A. W. C., 1870). On the bluff ocean bank on the farm of Mr. Cooley. Follow the road toward Chetko until you come to the point where it descends the bank, then turn to the left, cross the fence, and the station will be found on the first projection south of the bank. The station is marked according to note 15.¹

Pine Hill (Curry County, A. W. C., 1870). On the right side of the road going north, above where it takes an abrupt turn to go down toward the Chetko River, on top of a hill that is very steep toward the road. Cross the little gulch just before the fence corner and the station is just above. The station is marked according to note 15.¹

Bare Ridge (Curry County, A. W. C., 1870). On the second bench of a long ridge ending in a conical hill, about 500 feet above the road and 580 feet above the sea. The station is marked according to note 15.¹

North Winchuck (Curry County, A. W. C., 1870). On the edge of the bluff bank about one-fourth mile north of the Winchuck River. To reach it follow the line of fence down from the road that formerly marked the State boundary to the bluff edge and the station is about 100 meters south. It is marked according to note 15,¹ except there is as a surface mark a stone block with a drill hole filled with lead in the top.

Rocky Butte (Curry County, A. W. C., 1870). Near the center of the flat space on the top of a singular rock rising boldly from the even slope between the road and the sea on land owned by Mr. Otto. The station is marked according to note 15.¹

Otto (Curry County, A. W. C., 1870). On the first top or bench of the ridge directly north of Mr. Otto's house, 100 feet above the road on the right side going north, and 280 feet above the sea. The station is marked according to note 15.¹

Henderson (Curry County, A. W. C., 1870). About one-half mile beyond the Winchuck River. Going northward along the road there is a large rock on the left and beyond it the home of Mr. Henderson. The station is on the first bench of the mountain east and 500 feet above the road and about 700 feet above the sea. The station is marked according to note 15.¹

Oregon-California Boundary Monument (Del Norte County, Cal., and Curry County, Oreg., A. W. C., 1870). The station was established by Daniel G. Major, United States land survey, in 1869, on the east side of the road about one-fourth mile south of the Winchuck River. It is 10 meters east of the road, about 2 meters west of the fence, and about 200 meters south of a barn belonging to Mr. Jackson and surmounted by a pair of elk antlers. The station is marked by a fir post about 4 feet high, roughly hewn on four sides about 5 inches square, set firmly in the ground and surrounded by a cairn of loose stones. On the west side it is marked "42 I 1869;" on the east "212 M 28 C;" on the south "C;" and on the north "O."

Northwest Seal Rock (Del Norte County, Cal., A. W. C., 1870). On Northwest Seal Rock, which culminates in a sharp apex. The station is on a sort of bench about 3 feet below the highest part. A natural cavity was widened to admit the foot of the signal and this is the only station mark. There are three iron spikes 2 inches in diameter driven around the station, used to hold the guy ropes.

Pyramid (Del Norte County, Cal., A. W. C., 1870). On the west side of the top, which is very small, of a conical hill covered with low bushes, directly north of the mouth of Smith River. The road runs between this hill and the end of the long ridge. The station is marked according to note 15,¹ with the addition of a square stone block, with a hole drilled in the center and filled with lead, used as a surface mark.

Peak (Del Norte County, Cal., A. W. C., 1870). On a conical peak north of Gilberts Creek. It is the highest bare peak seen from the road after crossing the creek. There are some fir trees immediately back and the nearest one was blazed and some tacks driven into the wood. The station was marked according to note 15.¹

Cone Rock (Del Norte County, Cal., A. W. C., 1870). In the center of the top of a large cone-shaped rock lying off the coast between the mouth of the Winchuck River and Island Rock. A hole drilled for the signal is the only mark.

Boulder (Del Norte County, Cal., A. W. C., 1870). On the ridge north of Gilberts Creek. To reach the station follow the ridge up and cross a depression after the first summit is reached, then the station lies to the right on a flat-topped hill. The station is marked according to note 15.¹

Bush (Del Norte County, Cal., A. W. C., 1870). Going north along the road across Gilberts Creek, on the other side of which lies a mountain with an arm extending toward the sea. The road sweeps around the base of this moun-

¹ See pp. 81 and 82.

tain and when near the bank passes close by a large rock; turning off here and mounting the face of the ridge, the station will be found on the first bench, marked according to note 15.¹

Hillside (Del Norte County, Cal., A. W. C., 1870). On the right side of the road above the Yonkers farm, on the hillside near the pine forest, and 110 feet above the road. The station is marked according to note 15.¹

Low Dune (Del Norte County, Cal., A. W. C., 1870). Near the center of a low sand dune, shifting in character, on the bluff bank opposite a large isolated rock on shore. The station is marked according to note 15.¹

Island (Del Norte County, Cal., A. W. C., 1870). On the highest part and near the center of the large island rock lying off the mouth of Smith River. The station is marked according to note 15.¹

Cone (Del Norte County, Cal., A. W. C., 1870). On a rounded grassy sand dune near the coast. The station is marked by a piece of stone one-half inch (probably foot) in diameter and 6 inches long shaped like a cylinder, with a hole bored in the top and filled with lead, set 3 feet below the surface. At the surface is a roughly squared stone with a hole drilled in it and filled with lead. Three stubs with copper tacks in the top of each were placed north, south, and east (magnetic) of the station, distant 0.91 meter.

Head (Del Norte County, Cal., A. W. C., 1870). On the end of the long ridge making down beyond Smith River, at the right of the road going north and 200 feet above it. The station is marked according to note 15,¹ with the addition of a square stone block, with a drill hole filled with lead in the top, as a surface mark.

Last (Del Norte County, Cal., A. W. C., 1870). On grassy ground on top of a bluff bank, north (?) of a large creek coming down from the hills. The station is marked according to note 15.¹

Patch (Del Norte County, Cal., A. W. C., 1870). On the side of the hill near the edge of the forest, on the right of the road going north, on the farm of Mr. Yonkers and southeast from his house. The station is marked according to note 15.¹

East (Del Norte County, Cal., A. W. C., 1870). On a spur making out from the mountain ridge above Smith River, 425 feet above mean low water. The station is immediately above some outcropping yellow rock which is visible from below the face of the ridge. The station is marked according to note 15,¹ with the addition of a square stone block with a drilled hole filled with lead as a surface mark.

Low Rock (Del Norte County, Cal., 1870). On the center of a low flat rock, the southern one of three, lying off the mouth of Smith River. The rock is about 12 feet high and when there is any swell the sea washes over it constantly. An iron bar, 4 inches square and 8 feet long, set in a square hole drilled in the solid rock marks the station.

Spur (Del Norte County, Cal., A. W. C., 1870). On the middle dune, which is covered with a green plant, on the end of a long ridge running down from Scott's house toward Smith River. The station is marked according to note 15.¹

Great Sand Dune (Del Norte County, Cal., A. W. C., 1870). On a great sand dune and as the sand is loose and drifting it probably can not be recovered. The station is marked according to note 15.¹

Indian (Del Norte County, Cal., A. W. C., 1870). On a low sand dune to the southward of a gap or low place in the line of sand dunes opposite the south end of the western arm of Lake Earl, about 100 meters from the high-water mark, with a few Indian huts below and to the north of it. The station is marked according to note 15,¹ except there is a roughly-squared block of blue sandstone, with a hole 1½ inches deep in the top filled with lead for a surface mark.

Eureka (Del Norte County, Cal., A. W. C., 1870). On a high sand ridge grassed over and forming the west side of the northeast arm of Lake Earl, about 100 meters from the lake edge. A few large firs grow on the side of the bank toward the lake. The station is marked by a bottle buried 3 feet below the surface, and at the surface by three stubs with copper tacks in the top of each, 0.91 meter, and bearing north, south, and east.

Lake End (Del Norte County, Cal., A. W. C., 1870). On a sand dune between high-water mark and the edge of the marsh at the northwest end of Lake Earl. The station is marked by a bottle buried 3 feet below the surface, and at the surface by three stubs with copper tacks in the top of each, distant 0.91 meter, and bearing north, south, and east.

Lake Earl north base (Del Norte County, Cal., A. W. C., 1870). Located about one-third of the way between T. A. Scott's lower ranch and the upper called Toutocket, between the northeast and northwest arms of Lake Earl, on a level grassy flat. A road from the lower to the upper ranch passes on the left, looking north, distant about 40 meters. The station is marked by a bottle buried 3 feet below the surface, and near the surface by a roughly-squared stone with a 2 inch hole drilled in it and filled with lead. A copper tack in the lead marks the station. Three stubs each with a copper tack in the top are distant 0.91 meter bearing north, south, and east.

Lake Earl south base (Del Norte County, Cal., A. W. C., 1870). On the west of the road and 71 paces northwest of a large post, and in line with the post and a willow copse to the westward. The station is marked by a bottle buried 3 feet below the surface, and at the surface by a square block of blue basalt, with a hole 1½ inches in diameter and 2 inches deep filled with lead, with a copper tack set in the lead. Three stubs each with a copper tack in the top are distant 0.91 meter and bear north, south, and east.

Gravel (Del Norte County, Cal., A. W. C., 1870). On a little round sand knoll on the narrow ridge separating Lake Earl from the ocean. A bed of gravel comes up nearly to the station on the ocean side. The station is marked according to note 15.¹

Burnt Ranch (Del Norte County, Cal., A. W. C., 1870). On the hill near the edge of the bluff going down to the slough, in the Indian village of Toutocket, sometimes called Burnt Ranch. The station is marked according to note 15.¹

Ridge (Del Norte County, Cal., A. W. C., 1870). On a grassy knoll surrounded by a swamp, about midway between Scott's house and the northeast arm of Lake Earl. There are a few fir trees growing on the side of the knoll toward the lake. The station is marked according to note 15.¹

¹ See pp. 81 and 82.

Lake Mound (Del Norte County, Cal., A. W. C., 1870). On a round grassy knoll on the south side of Lake Earl opposite Scott's house and west of the Indian Rancherie. The lake turns here with an arm to the east and south. The station is marked according to note 15.¹

Squaw (Del Norte County, Cal., A. W. C., 1870). On a large mound on the west side of the eastern and southern arm of Lake Earl, a few feet north of the largest of several Indian huts, and south of some Indian graves. The station is marked according to note 15.¹

Red Point (Del Norte County, Cal., A. W. C., 1870). On the low gravel flat between the marsh and the lake, on the east side of the eastern arm of Lake Earl, and on a point that forms the north side of the bight into which Jordans Creek empties. A quantity of red sorrel gives a ruddy hue to the point as seen from the opposite shore. The station is marked according to note 15.¹

Swamp (Del Norte County, Cal., A. W. C., 1870). On low ground, overflowed in the winter, on the southeastern side of Lake Earl, on the left of the narrow passage leading into the mill. A few dwarf firs are between the station and the lake and behind the station is quite a mass of undergrowth. The station is marked according to note 15.¹

Lake (Del Norte County, Cal., A. W. C., 1870). About midway between Lake Earl and the ocean, on the sand knoll on the north side of the narrow place where the lake approaches the ocean. The lake discharges through this narrow place in the winter. The station is marked according to note 15.¹

Yank (Del Norte County, Cal., A. W. C., 1870). On a sand dune, the northern and eastern face of which is covered with fir trees, about 300 meters northwest of the house of a settler called Yank. The road to *Yank* passes at the foot of the dune. The station is marked according to note 15.¹

Pine Bush (Del Norte County, Cal., A. W. C., 1870). On the highest sand hill in this vicinity, about half way between the beach and the fir forest, with a marsh on the east, and several ponds, during the rainy season, on the west. The east side of the knoll is covered with pine bush. The station is marked according to note 15.¹

Pond (Del Norte County, Cal., A. W. C., 1870). On a small hill partially covered with scrubby fir bushes. Behind the hill is a pond whose surface is covered with lilies. The station is marked according to note 15.¹

Stick (Del Norte County, Cal., A. W. C., 1870). On the line of sand dunes just above the high-water mark. The station is marked according to note 15.¹

Hut (Del Norte County, Cal., A. W. C., 1870). On the first ridge of sand dunes east of the high-water mark, with a few Indian huts to the west, and a pond of fresh water, during the rainy season, on the east. The station is marked according to note 15.¹

Round (Del Norte County, Cal., A. W. C., 1870). The station is on a small round sand dune and is marked according to note 15.¹

Skull (Del Norte County, Cal., A. W. C., 1870). On a large sand dune, where several skulls were found, it having been an Indian burying ground. The station is marked according to note 15.¹

Forest Mound (Del Norte County, Cal., A. W. C., 1870). On a high sand mound which forks into two long ridges on the west, near the edge of the forest, with a low marsh skirting the hill on the north. The station is marked according to note 15.¹

Pine (Del Norte County, Cal., A. W. C., 1870). The station is on the inner line of sand dunes, near the forest. It is marked according to note 15.¹

Flag (Del Norte County, Cal., A. W. C., 1870). On the first prominent sand knoll back of the beach about 100 meters from the high-water mark. The station is marked according to note 15.¹

Firknoll (Del Norte County, Cal., A. W. C., 1870). On a sand dune 40 feet high and 310 meters distant from the beach, near the edge of the forest, with dwarf firs surrounding it on three sides, leaving it open to the sea. The station is marked according to note 15.¹

Drift (Del Norte County, Cal., A. W. C., 1870). On the first ridge of a sand dune about 70 meters from the high-water mark. The station is marked according to note 15.¹

Knob (Del Norte County, Cal., A. W. C., 1870). On a long sand ridge sparsely covered with grass, sloping to the east, to the edge of the fir forest, distant about 10 meters. The station is marked according to note 15.¹

Sand (Del Norte County, Cal., A. W. C., 1869). On the highest of the sand dunes near the point where the forest comes down to the shore of Pelican Bay, beyond which the shore line becomes low, and confused sand dunes appear. The following magnetic azimuths are given: Westernmost rock of reef, 98°; highest point Star Rock, 42°; center of the top of Rock St. George, 13°. The only station mark mentioned is a stub with five copper tacks in the top, 1½ feet southeast of the station.

St. George (Del Norte County, Cal., A. W. C., 1869). On the summit of the highest rock of Point St. George, which is connected with the main shore by a narrow neck of land. The seaward face of the rock shows white. The station is marked by a bottle buried neck down 3 feet below the surface, and at the surface by a stone block with a hole drilled in the center and filled with lead.* There are three stubs around the station, with five copper tacks in the top of each, distant 1.83 meters, bearing north, south, and east, respectively.

St. George north base (Del Norte County, Cal., A. W. C., 1869). On the ridge of a chain of sand hills running nearly parallel and about 70 meters east of a fence, extending in a southerly direction. The following bearings are given: Castle Peak Rock, highest point, S. 12° E. (magnetic); Point Rock, highest point, south (magnetic); St. George Rock, highest point, S. 32° W. (magnetic); and five copper tacks in a blazed fence post, distant 86.3 meters, N. 70° E. (magnetic).

¹ See pp. 81 and 82.

The station is marked by a bottle buried neck down 3 feet below the surface, and at the surface by a hole drilled in a block of blue sandstone and filled with lead. There are three stubs around the station, one each north, south, and east, distant 1.83 meters. In the top of each there are five copper tacks.

Woodedge (Del Norte County, Cal., A. W. C., 1869). On a mound close to the forest line. The following magnetic azimuths are given: Top of St. George Rock, 28° ; westernmost rock of reef, 95° ; five copper tacks in a tree, distant 13.59 meters, 235° . The station is marked by a bottle buried neck down 3 feet below the surface.

Mound (Del Norte County, Cal., A. W. C., 1869). On the northwestern part of the last one of a series of mounds in an easterly direction from Rock St. George. The station is marked by a bottle buried neck down 3 feet below the surface. There are three stubs, with five copper tacks in the top of each, distant 1.83 meters, and bearing, respectively, north, south, and east. The following magnetic azimuths are given: Connection Rock, 337° ; top of Castle Peak Rock, 4° ; Point Rock, $29^\circ 40'$; center of top of Rock St. George, 72° .

Shell (Del Norte County, Cal., A. W. C., 1869). Located on the northeast bluff of Point St. George. The ground in the vicinity is covered with shells and loose stones. The center of the top of St. George Rock bears S. 7° E. (magnetic), and the highest point of Star Rock bears S. 53° W. (magnetic). The station is marked by a bottle buried neck down 3 feet below the surface. There are three stubs, with five copper tacks in the top of each, distant 1.83 meters and bearing, respectively, north, south, and east.

St. George south base (Del Norte County, Cal., A. W. C., 1869). On the plateau north of Castle Peak Rock, and 150 meters inshore. Five copper tacks in a blazed tree, distant 91.1 meters, bear S. 48° E. (magnetic). The highest point of Castle Peak Rock bears S. 17° E. (magnetic); Point Rock highest point bears S. 11° W. (magnetic); and St. George Rock highest point bears N. 87° W. (magnetic). The station is marked by a bottle buried neck down 3 feet below the surface, and at the surface by a block of blue sandstone with a hole drilled in the center and filled with lead. There are three stubs around the station, one each north, south, and east, distant 1.83 meters. In the top of each there are five copper tacks.

Castle Rock (Del Norte County, Cal., A. W. C., 1869). On the right hand knob, looking south, of the highest peak of the large rock known as Castle Island or Castle Rock. At a little distance the peak resembles the horn of a rhinoceros and can not be mistaken. The only mark is the hole which was drilled for the foot of the signal.

Connection Rock (Del Norte County, Cal., A. W. C., 1869). Near the center of the large rock lying off Preston Point and showing white from the shore. A hole drilled to receive the foot of the signal and a cairn of rock piled up around it are the only marks.

Preston 2 (Del Norte County, Cal., A. W. C., 1869). On Preston Island. No permanent mark.

Wynell (Del Norte County, Cal., A. W. C., 1869). A few feet east of the road leading from Crescent City to White's ranch and in sight of the latter. The station is marked by a bottle buried neck down 3 feet below the surface. The following magnetic azimuths are given: Five copper tacks in a tree distant 29.41 meters, $299^\circ 30'$; top of Castle Peak Rock 29° ; and Rock Point $75^\circ 30'$.

White (Del Norte County, Cal., A. W. C., 1869). On the highest part of the bluff that is inshore from two isolated rocks off Point St. George, which are connected with the mainland at low water only. The station is marked by a bottle buried neck down 3 feet below the surface. There are four stubs with five copper tacks in the top of each, distant 1.83 meters, and bearing, respectively, north, south, east, and west.

Point (Del Norte County, Cal., A. W. C., 1869). On the first of the two rocks lying off Point St. George, which are connected at low water with the mainland. The station is marked by a bottle buried neck down 3 feet below the surface. Three stubs bearing, respectively, north, south, and east, with five copper tacks in the top of each, are distant 1.83 meters.

Crescent City Azimuth (Del Norte County, Cal., A. W. C., 1870). On a bluff bank about 3 meters from the edge. The station is marked by a bottle buried 3 feet below the surface and at the surface by a stone block 4 inches square, with $1\frac{1}{2}$ -inch hole drilled 2 inches deep and filled with lead. A copper tack is driven in the lead and the letters "U. S. C. S." are carved in the stone. Three very heavy posts were set around the stone and a fence built to protect it from the cattle.

Battery Point 2 (Del Norte County, Cal., A. W. C., 1869). Lost 1871.

Steamboat Rock (Del Norte County, Cal., J. S. L., 1859; 1869). On the highest part of Steamboat Rock, about 7.5 meters from the northern edge of the top of the rock, about 15 meters from the southern edge, and 12 meters from a small but very noticeable prominence on a large detached piece of rock on the south end of the ridge. The station is marked by a one-half inch hole drilled $1\frac{1}{4}$ inches in solid rock.

Whalers Island (Del Norte County, Cal., J. S. L., 1859; 1869). On the second, counting from the northward of the four prominent knobs on Whalers Island, on a flat spot $1\frac{1}{2}$ feet square, having three small projections rising around it, forming sort of a basin, near the center of which is the station. The station is marked by a drill hole one-half inch in diameter and 1 inch deep.

Smyth 2 (Del Norte County, Cal., G. D., 1871). On a long, low, gradually rounding point about a mile east of Elk Creek. The station is marked by a bottle buried $2\frac{1}{2}$ feet below the surface, and at the surface is a stone 8 by 6 by 4 inches, with a one-half inch hole drilled in it.

Ehroser 2 (Del Norte County, Cal., A. W. C., 1871). On a narrow ridge of sand extending along the beach just above the high-water mark. The station is marked according to note 15.¹

¹ See pp. 81 and 82.

Round Rock (Del Norte County, Cal., J. S. L., 1859; 1869). On the top of Round Rock, which is about 20 feet in diameter and nearly level, with some three or four slight elevations or mounds. The station is on the northeast one of these mounds and is marked by a one-half inch drill hole in the rock $1\frac{1}{2}$ inches deep.

Alexander (Del Norte County, Cal., A. W. C., 1871). On the bank just behind the driftwood southeast of Alexander's stable, and immediately outside the fence, 18 meters from the southeast corner of the stable, and 0.89 meter from the fence. The station is marked according to note 15.¹

Crescent City northeast base (Del Norte County, Cal., J. S. L., 1859; 1869). Lost.

Smyth (Del Norte County, Cal., J. S. L., 1859). Lost.

Crescent City southwest base (Del Norte County, Cal., J. S. L., 1859; 1869). Lost.

Astronomical (Del Norte County, Cal., —, 1853). Lost.

Battery (Del Norte County, Cal., J. S. L., 1859). Lost 1869.

Preston (Del Norte County, Cal., J. S. L., 1859). Lost.

Sister Rock (Del Norte County, Cal., A. W. C., 1871). On the highest peak, 108 feet above sea level, of the largest of the three rocks lying offshore below Crescent City and known as Sister Rocks. The station is marked by a bottle with the neck broken off, placed in a natural crevice in the rock.

Long Point (Del Norte County, Cal., A. W. C., 1871). On a long projecting point, close to the trail and west of it, 765 feet above sea level. The station is marked according to note 15.¹

White Knob (Del Norte County, Cal., A. W. C., 1871). On the high knob or point that forms the end of the stretch of beach below Crescent City. To reach the station follow the trail up to the first ridge and turn to the right. It will be found on a rock forming the southern point. The station is marked by a hole drilled in the rock and filled with broken glass.

Woody Point (Del Norte County, Cal., A. W. C., 1871). On an open point well down toward the edge of the bluff and west of the trail. The station is marked according to note 15.¹

Green (Del Norte County, Cal., A. W. C., 1871). On a point making out from near the branching of the trails below Long Point, partly down the hill, on a round hummock on the face of the ridge, 780 feet above sea level. The station is marked according to note 15.¹

Bush (Del Norte County, Cal., A. W. C., 1871). The station is on a prominent point, and it is marked according to note 15.¹

Point (Del Norte County, Cal., A. W. C., 1871). On a long projecting point easily distinguished by several large rocks on its sea surface. The station is on top of one of these rocks where the surface was covered with a thick growth of small bushes. It is necessary to use ladders to reach the top of the rock. The station is marked according to note 15.¹

Grant (Del Norte County, Cal., A. W. C., 1871). West of the trail on the only clear point, on the bluff edge, in the vicinity, 740 feet above the sea level. The station is marked according to note 15.¹

Low (Del Norte County, Cal., A. W. C., 1871). On a great slide of earth which is now solid. The station is marked according to note 15.¹

Near (Del Norte County, Cal., A. W. C., 1871). On a projecting point close to the trail. The station is marked according to note 15.¹

Wilson (Del Norte County, Cal., A. W. C., 1871). On a high pine-backed hill on the left side of the trail going toward the Klamath River, behind a number of rocks on the sidehill. The station is marked according to note 15.¹

Last (Del Norte County, Cal., A. W. C., 1871). On a marked bluff or point making out beyond Wilson Creek or False Klamath, and about halfway between the creek and the long point off which lay the island rocks, about 180 feet above the sea level. The station is marked according to note 15.¹

Rock (Del Norte County, Cal., A. W. C., 1872). On the highest point of a small rock, not over 18 or 20 feet in height, below the False Klamath, and about $1\frac{1}{4}$ miles offshore. The station was in a natural crevice in the rock and the stones piled around the signal serve as the only station mark.

Halfway (Del Norte County, Cal., A. W. C., 1872). On the summit of a hill about halfway between the False Klamath and the Klamath River. The station is marked according to note 15.¹

Pine Ridge (Del Norte County, Cal., A. W. C., 1872). On the summit of a high hill crowned with a few small pine trees, with the trail passing on the upper side and only a few feet distant. The station is marked according to note 15.¹

Council Mound (Del Norte County, Cal., A. W. C., 1872; 1873). On a rounded hill or knoll forming the culmination of the long ridge on the north side of the Klamath River, on the left side of the trail going south and distant about 300 meters. The station is marked according to note 15.¹

Flint Rock (Del Norte County, Cal., A. W. C., 1872; 1873). Lost.

Council Point (Del Norte County, Cal., A. W. C., 1872). On a prominent point of the long ridge on the north side of the Klamath River, about 300 feet above the beach, in front of quite a prominent clump of rocks, with the trail passing above it distant about 300 meters. The station is marked according to note 15.¹

Klamath South (Del Norte County, Cal., A. W. C., 1872; 1873). Lost. The station was marked according to note 15.¹

Redding Rock (Humboldt County, Cal., A. W. C., 1874). Redding Rock is a single isolated peak of quartz, 5 miles offshore from Gold Bluffs. (See fig. 9.) The station is on the highest point of the rock, 94 feet above high water. The station is marked by a square hole drilled in the rock at the bottom of which is a round hole in which an iron pin $1\frac{1}{2}$ inches in diameter is set. Around the station are some iron pintles set in the rock at requisite distances to which the guy ropes were attached.

¹ See pp. 81 and 82.

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FIG. 9.—REDDING ROCK, CALIFORNIA, ONE OF THE MANY ROCKS OFF THE COASTS OF CALIFORNIA AND OREGON.

Split Rock (Humboldt County, Cal., A. W. C., 1874). On a remarkable promontory or projection of the coast line, on the right of the trail going south from the mouth of the Klamath River. The station is marked according to note 15.¹

Alder Butte (Humboldt County, Cal., A. W. C., 1874). On a prominent butte south of Split Rock, on the left of the trail going south. Below the station there is a grove of alders. The station is marked according to note 15.¹

Johnson (Humboldt County, Cal., A. W. C., 1874). Following the trail south from the ranch of Mr. Johnson, up the hill and through the timber until a bare ridge is finally reached. From here the trail leads down to the Ossegan Indian village and creek of the same name. As the trail begins to descend turn sharply to the right and the station will be found on a commanding point overlooking the sea, about 400 meters from the trail. The station is marked according to note 15,¹ except there is a stone above the bottle with a drill hole in it.

Upper Bluff (Humboldt County, Cal., A. W. C., 1874). On the bench or slide from the main bluff near the works of the Upper Gold Bluff Mining Co., and 10 meters north of an old rotten stump. The Upper Gold Bluffs are one continuous line of vertical cliffs south from Ossegan Creek, and the station is just north of the point where the first break in this line occurs. The station is marked by a bottle buried 3 feet below the surface, and at the surface by a drill hole in a square stone block, and by four stubs with copper tacks in the top of each and bearing north, south, east, and west (magnetic).

Mussel Point (Humboldt County, Cal., A. W. C., 1874). About 1½ or 2 miles beyond the Lower Gold Bluff mine and dwelling houses, on a bold promontory which is the first marked point projecting beyond the beach below the bluffs. The station is marked by a bottle buried 3 feet below the surface, and at the surface by a drill hole in a square stone, surrounded by four stubs with copper tacks in the tops bearing north, south, east, and west (magnetic).

Sharp Point (Humboldt County, Cal., A. W. C., 1874). On an exceedingly prominent knoll or promontory standing out from the mainland about 1 mile south of the spot where the stone lagoon approaches the beach. The station is on the sharp apex of the peak forming the end of the point, on a spot leveled off to afford room for the signal. A rock left standing was dressed off square and a drill hole in this rock marks the station.

Big Lagoon (Humboldt County, Cal., A. F. R., 1870; 1874). Nine miles north of Trinidad by the coast trail, on the northern end of the bluff north of Rock Point, about 300 meters south of the point where the coast trail leaves the bluff and leads on to the Big Tyoon beach, about 60 feet above the tide. The station is marked by a stub 3 feet long with the top level with the surface surrounded by four witness marks with tacks in the top of each, distant 1.83 meters, bearing north, south, east, and west.

Patricks Pinnacle (Humboldt County, Cal., A. F. R., 1870; 1874). On the point known as Rocky Point about 8 miles north of Trinidad by the coast trail, on a pinnacle of rocks piled up in a huge mass of fragments. The station is marked by a stub 2 feet long with rocks piled up around it.

Inner Turtle Rock (Humboldt County, Cal., A. F. R., 1870). On the highest point of the smaller of the two Turtle Rocks, the last off-lying rocks north of Trinidad. There is no permanent station mark.

Patricks Point South (Humboldt County, Cal., A. F. R., 1870). About 7 miles north of Trinidad by the coast trail. The station is marked by a nail in the top of a stub 3 feet long, set level with the surface.

Castle (Humboldt County, Cal., A. F. R., 1870). On the prominent rock called Castle Rock, overlooking the Forty Nine trail and within shooting distance thereto. The station is the lowest point in the hole in the rock, said to have been used as a rifle pit by a former settler named Patrick.

Bight Tree (Humboldt County, Cal., A. W. C., 1870). The station is a tree marked by girdling about 1 foot wide and 3 feet above the ground, in the deepest part of the indentation between Trinidad Head and Big Lagoon, on the top of the bluff about 200 feet above the tide.

COMPUTATION, ADJUSTMENT, AND ACCURACY OF THE ELEVATIONS.

The zenith distances directly observed at each station were first computed. These zenith distances were corrected for height of the object observed and of instrument so as to refer them all to the ground at each station or to the station marks.

The difference of elevation of each pair of stations in the main scheme was then computed from the observations over the line joining them by the formula

$$h_2 - h_1 = s \tan \frac{1}{2} (\zeta_2 - \zeta_1) \left[1 + \frac{h_2 + h_1}{2\rho} + \frac{s^2}{12\rho^2} \right]$$

in which h_2 and h_1 are elevations of the stations, ζ_2 and ζ_1 are the measured zenith distances as corrected for height of instrument and of object observed, s is the horizontal distance between the stations, and ρ is the radius of curvature.

As there are always two or more lines to each new station, many rigid conditions exist between the observed difference of elevation, even if the connections with the precise leveling were ignored, and the least square adjustment furnishes the readiest accurate means of deriving the required elevations.

¹ See pp. 81 and 82.

The elevations given in the following tables were adjusted in several sections. The weight p assigned to each difference of elevation was computed by the formula $\log p = 9 - 2 \log s$. The length of line corresponding to unit weight is 31.7 kilometers, or 19½ miles. Hence there is an equal chance whether the elevation over a line of this length is in error by an amount greater or less than the probable error of unit weight.

The following table gives the probable error of unit weight of the several sections. The elevations in the "Vicinity of Portland" are from Special Publication No. 13, "The California-Washington Arc of Primary Triangulation," and are a part of the adjusted elevations between the Willamette base net and Tacoma base. The probable error of unit weight given here is derived from this whole section.

Section.	Probable error of unit weight.
	<i>Meters.</i>
Umpqua River to Tillamook Bay.....	±1.18
Coos Bay and San Sebastian.....	±1.19
Rogue River to Klamath River.....	±1.98
Mouth of Columbia River.....	±1.58
Vicinity of Portland.....	±0.78

ELEVATIONS.

The datum for all elevations is mean sea level.

The elevations are divided into three classes: First, those fixed directly by spirit leveling or by tidal bench marks which are subject to very small errors; second, the stations in the main scheme, which are fixed by reciprocal measures of vertical angles; third, the intersection stations, of which the elevations are fixed by the measure of vertical angles which are not reciprocal, since the intersection stations are not occupied, and whose elevations are subject to errors which may be as great as 3 meters.

The accuracy with which the elevation of any station in the main scheme is determined depends mainly upon the remoteness of that station from the nearest one of which the elevation is fixed by spirit leveling. Long Ridge, with a probable error of ±1.17 meters, is probably the least accurately determined of any of the stations in the main scheme between Rogue River and Klamath River.

TABLE OF ELEVATIONS.

Umpqua River to Tillamook Bay.

Station.	Point to which elevation refers.	Elevation.		Station.	Point to which elevation refers.	Elevation.	
		Meters.	Feet.			Meters.	Feet.
<i>Class 1.</i>				<i>Class 2—Continued.</i>			
Bench.....	Station mark.....	1.77	5.81	Cummins.....	Station mark.....	755.6	2479.0
<i>Class 2.</i>				Table.....	do.....	838.9	2752.3
Beach.....	Station mark.....	5.5	18.0	Life.....	do.....	36.0	118.1
Wind.....	do.....	17.2	56.4	Iron.....	do.....	198.6	651.6
Cab.....	do.....	5.0	16.4	Yaquina Lighthouse.....	Center of ball.....	51.9	170.3
Sand Hill 2.....	do.....	32.6	107.0	Bald.....	Station mark.....	849.7	2787.7
Umpqua River Lighthouse.....	Center of ball.....	53.0	173.9	Foulweather.....	do.....	315.0	1033.5
Brushy Hill 2.....	Station mark.....	74.5	244.4	Cascade.....	do.....	477.1	1565.3
Burn.....	do.....	134.1	440.0	Salmon.....	do.....	180.9	593.5
Dean.....	do.....	479.0	1571.5	Ilebo.....	do.....	961.0	3152.9
Trail.....	do.....	268.4	880.6	Buzzard Butte.....	do.....	513.8	1685.7
Maple.....	do.....	343.8	1127.9	Round Top.....	do.....	364.3	1195.2
Cape.....	do.....	431.7	1416.3	Flat.....	do.....	303.5	995.7
Sugar Loaf 2.....	do.....	35.3	115.8	Fletcher.....	do.....	64.3	211.0
Cannery Hill.....	do.....	43.3	142.1	Bozley.....	do.....	157.3	516.1
Green.....	do.....	140.7	461.6	Sheep Hill.....	do.....	119.4	391.7
Spur.....	do.....	200.2	656.8	Gage B.....	do.....	151.8	498.0
Snag.....	do.....	442.4	1451.4	Ginger.....	do.....	468.4	1536.7
Loaf.....	do.....	52.4	171.9	Shell Point.....	do.....	2.6	8.5
Heceta.....	do.....	160.6	526.9	<i>Class 3.</i>			
Heceta Head Lighthouse.....	Center of ball.....	67.9	222.8	Doty.....	Top of peak.....	438.3	1438.0
Turn.....	Station mark.....	104.1	341.5	Boulder Point.....	Station mark.....	0.8	2.6
Head.....	do.....	84.0	275.6	Euchre Mountain.....	Top of trees.....	786.3	2579.7
Fairview.....	do.....	703.0	2306.4	Cape Lookout Summit.....	do.....	605.8	1987.5
Plateau.....	do.....	437.1	1434.0	Green Hill 2.....	Station mark.....	126.8	416.0
Tree.....	do.....	115.6	379.3				

Coos Bay and San Sebastian.

Station.	Point to which elevation refers.	Elevation.		Station.	Point to which elevation refers.	Elevation.	
		Meters.	Feet.			Meters.	Feet.
<i>Class 1.</i>				<i>Class 2.—Continued.</i>			
U. S. G. S. bench mark Marshfield.	Bronze tablet marked 11.	3.28	10.778	Stack.....	Station mark.....	1062.7	3486.5
<i>Class 2.</i>				<i>Class 3.</i>			
Camas.....	Station mark.....	995.6	3266.4	Craggy.....	do.....	1368.3	4489.2
Bolivar.....	do.....	1309.8	4297.2	Bosley.....	do.....	1037.4	3403.5
Johnson.....	do.....	890.8	2922.6	Grizzley.....	do.....	705.4	2314.3
Bennett.....	do.....	661.5	2170.3	Sundown 2.....	do.....	648.0	2126.0
Sugar.....	do.....	453.8	1488.8	Dolan.....	do.....	216.1	709.0
Westport.....	do.....	216.8	711.3	Red Rock.....	do.....	394.6	1294.6
Cathcart.....	do.....	557.6	1829.4	Butler.....	Station mark.....	891.4	2924.5
Marshfield Hill.....	do.....	70.6	231.6	Cotton.....	do.....	566.4	1858.3
Noah.....	do.....	279.6	917.3	Salmon Mountain.....	Top of peak.....	962.4	3157.5
White Point 3.....	do.....	8.6	28.2	Port Orford astronomic 2.....	Station mark.....	74.1	243.1
Mill.....	do.....	51.3	168.3	Arch Rock.....	Top of rock.....	35.0	114.8
Porter.....	do.....	20.3	66.6	Colliers Butte.....	Top of sharp peak.....	1315.4	4315.6
Pierce.....	do.....	15.9	52.2	Heads.....	Station mark.....	78.2	256.6
Edson.....	do.....	841.8	2761.8	Madden.....	do.....	242.4	795.3
Bill.....	do.....	464.0	1522.3	Rocky Peak.....	Top of peak.....	971.3	3186.7
Bald.....	do.....	900.5	2954.4	Saddle Mountain.....	do.....	1332.9	4373.0
Cape.....	do.....	56.0	183.7	Sixes.....	Station mark.....	60.5	198.5
Squirrel.....	do.....	1611.0	5285.4	Mount Emery or Chetko.....	Top of peak.....	829.5	2721.4

Rogue River to Klamath River, Cal.

<i>Class 1.</i>				<i>Class 3.</i>			
Redding Rock.....		0.00	0.00	Mound.....	Station mark.....	244.8	803.1
<i>Class 2.</i>				Klamath South 2.....	do.....	144.2	473.1
Pollywog.....	Station mark.....	811.1	2661.1	Preston Peak South.....	Top of peak.....	2206.0	7237.5
Elk.....	do.....	504.6	1655.5	Small Hill southwest of Bosley.....	Bushes.....	625.5	2052.2
Pack Saddle.....	do.....	815.7	2676.2	Bear Mountain.....	Top of peak.....	1948.1	6391.4
High Divide.....	do.....	708.8	2325.4	Second peak north of Preston Peak.....	do.....	2069.9	6791.0
Long Ridge.....	do.....	1056.0	3464.6	Four Brothers No. 1.....	do.....	1588.7	5212.3
Bald Hill.....	do.....	585.2	1919.9	Four Brothers No. 2.....	do.....	1608.7	5277.9
Gordon.....	do.....	1256.1	4121.1	Four Brothers No. 3.....	do.....	1611.2	5286.1
Child.....	do.....	698.2	2290.7	Four Brothers No. 4.....	do.....	1602.2	5256.6
Rattle.....	do.....	1100.5	3610.6	Preston Peak.....	do.....	2217.2	7274.3
Red Mountain.....	do.....	1287.7	4224.7	Peak No. 6.....	do.....	1911.3	6270.7
				Sawtooth north.....	do.....	1759.1	5771.3
				Sawtooth south.....	do.....	1753.2	5752.0
				Peak No. 8.....	do.....	1575.2	5168.0

Mouth of the Columbia River.

<i>Class 2.</i>				<i>Class 2—Continued.</i>			
Scarboro Hill 2.....	Station mark.....	207.3	680.1	Tillamook Head.....	Station mark.....	346.3	1136.1
Saddle Mountain 2.....	do.....	995.6	3266.4	Battery.....	do.....	81.7	268.0

Vicinity of Portland, Oreg.

<i>Class 1.</i>				<i>Class 2—Continued.</i>			
Oregonian.....	Top of tower.....	69.22	227.10	Fir.....	Station mark.....	345.9	1134.8
<i>Class 2.</i>				Monument, General Land Survey.....	do.....	289.7	950.5
River.....	Station mark.....	50.2	164.7	Warren.....	do.....	38.9	127.6
Cem.....	do.....	823.8	2709.3	Rocky Butte.....	do.....	185.3	607.9
Hill.....	do.....	296.8	973.8				

EXPLANATION OF THE SKETCHES.

On the following sketches there are shown the location of all the points whose positions are given in this publication, except those in the table of lost positions and the reference marks whose positions are computed, so that the names of all the stations in any locality may be secured simply by the inspection of a sketch, and then from the index their positions may readily be found in the table of positions. A line of the main scheme is shown as a full line when observed over in both directions, and is broken at one end when not observed over from the station at that end of the line. The stations that were occupied are shown by a triangle and the unoccupied stations by a circle. The measured bases are indicated by a heavy line.

On the first of the sketches is shown the general location in the United States of the areas covered by published triangulation which has been rigidly computed on the North American datum. The second is an index map for the sketches which show the triangulation in detail.

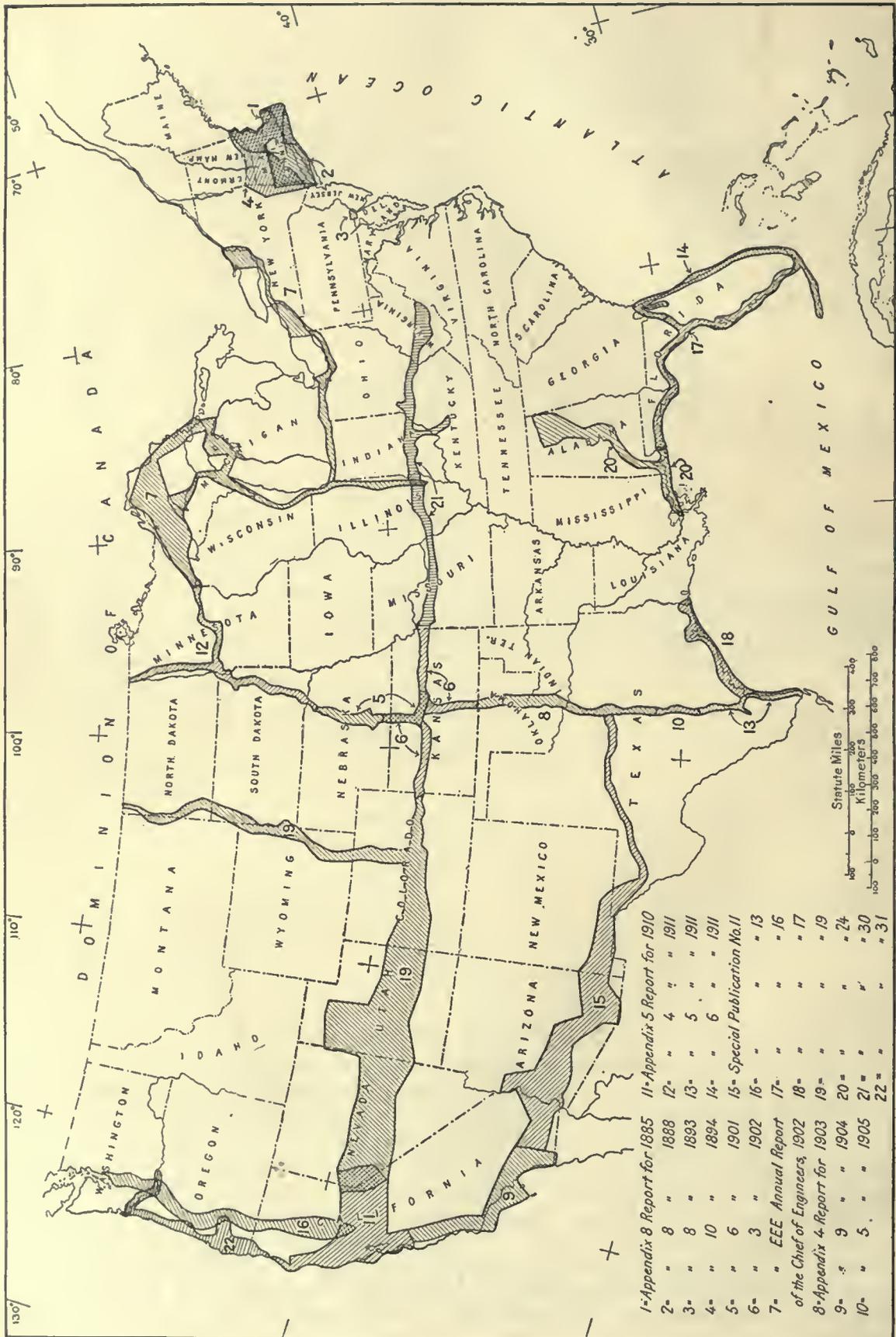
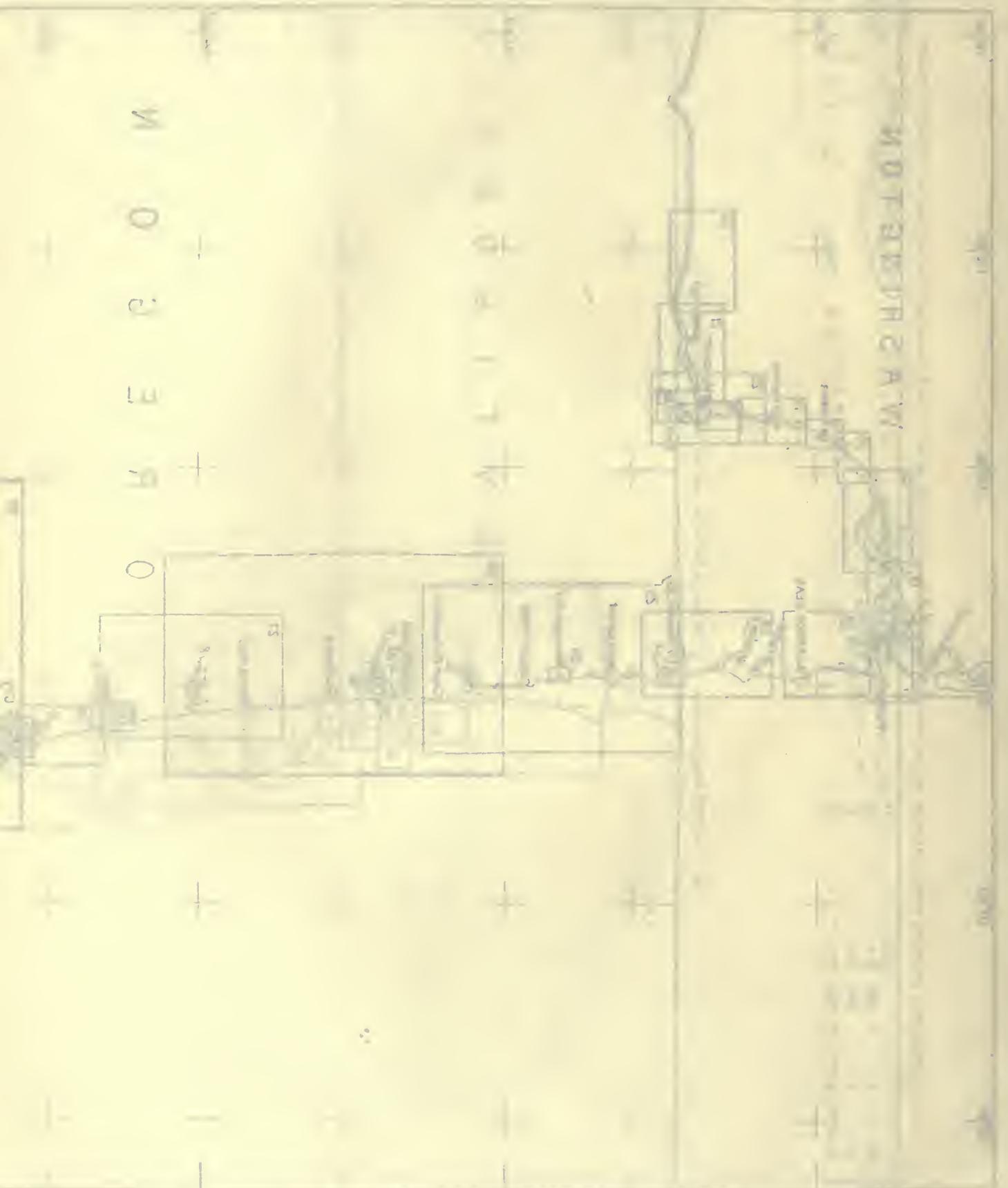


FIG. 10.—INDEX MAP SHOWING AREAS COVERED BY PUBLISHED TRIANGULATION WHICH HAS BEEN RIGIDLY COMPUTED ON THE NORTH AMERICAN DATUM.

МОТОВИНСКА

ПОДАТИ

МОТО



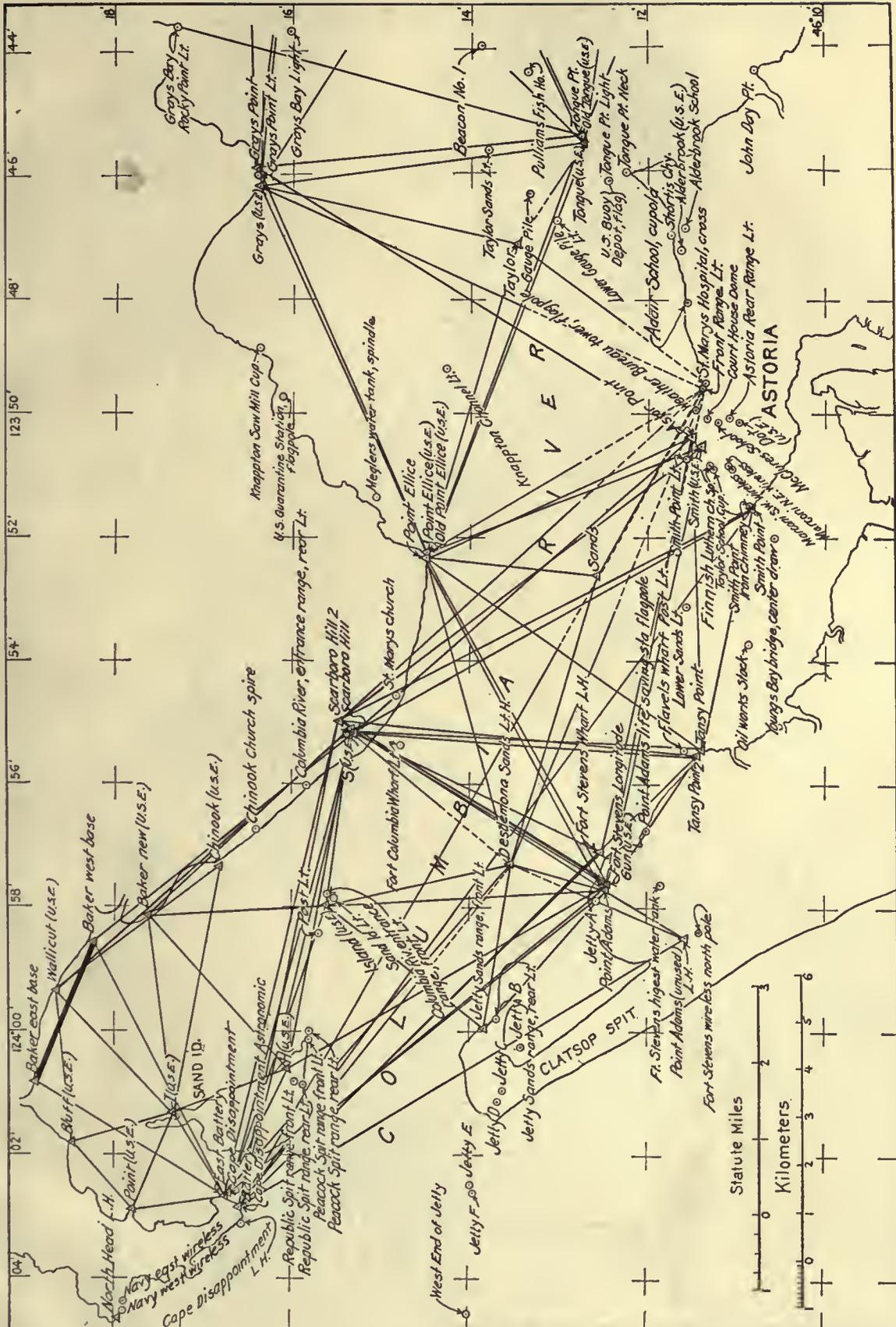


FIG. 12.—TRIANGULATION, MOUTH OF THE COLUMBIA RIVER.

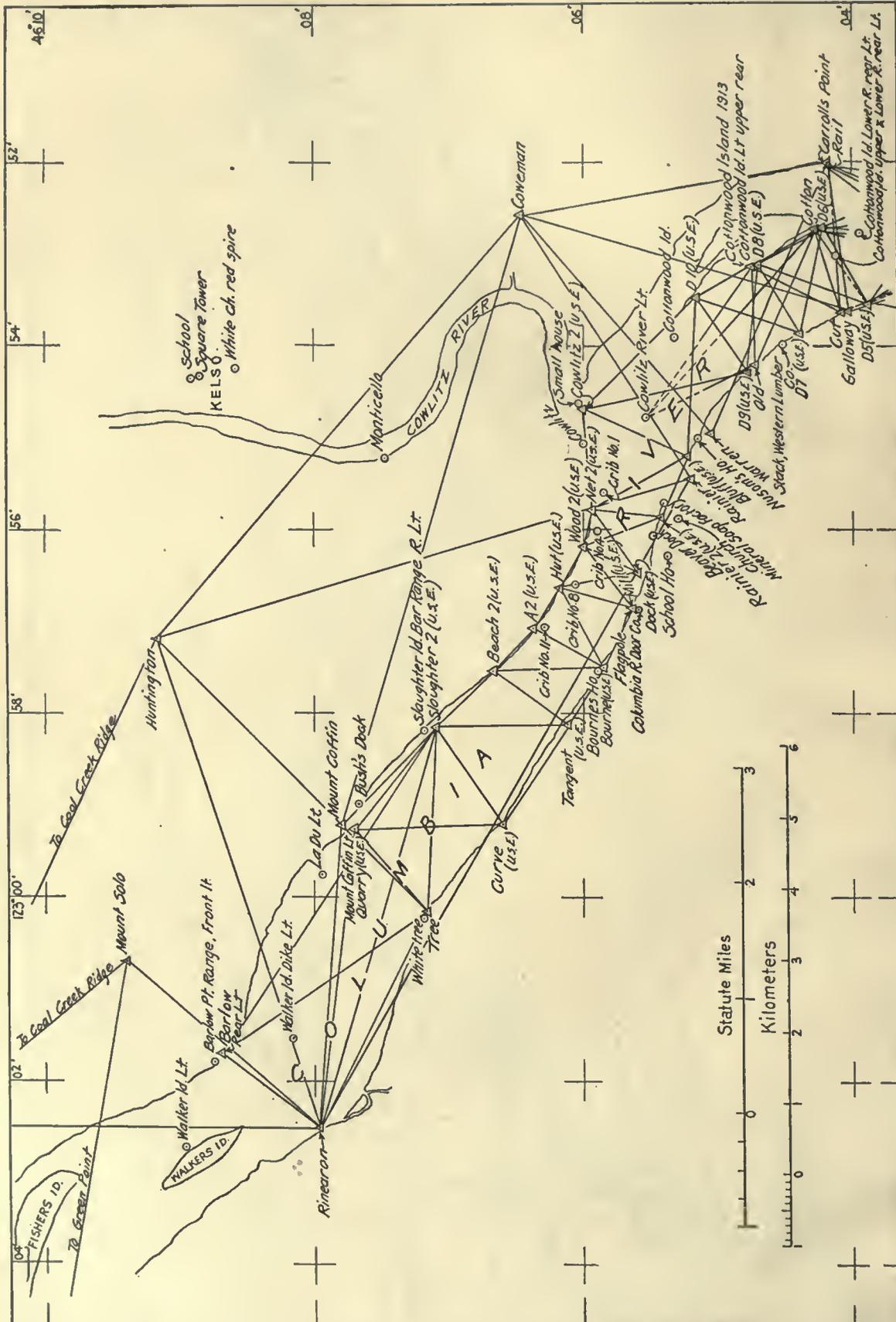


FIG. 15.—TRIANGULATION, COLUMBIA RIVER, WALKER ISLAND TO COTTONWOOD ISLAND.

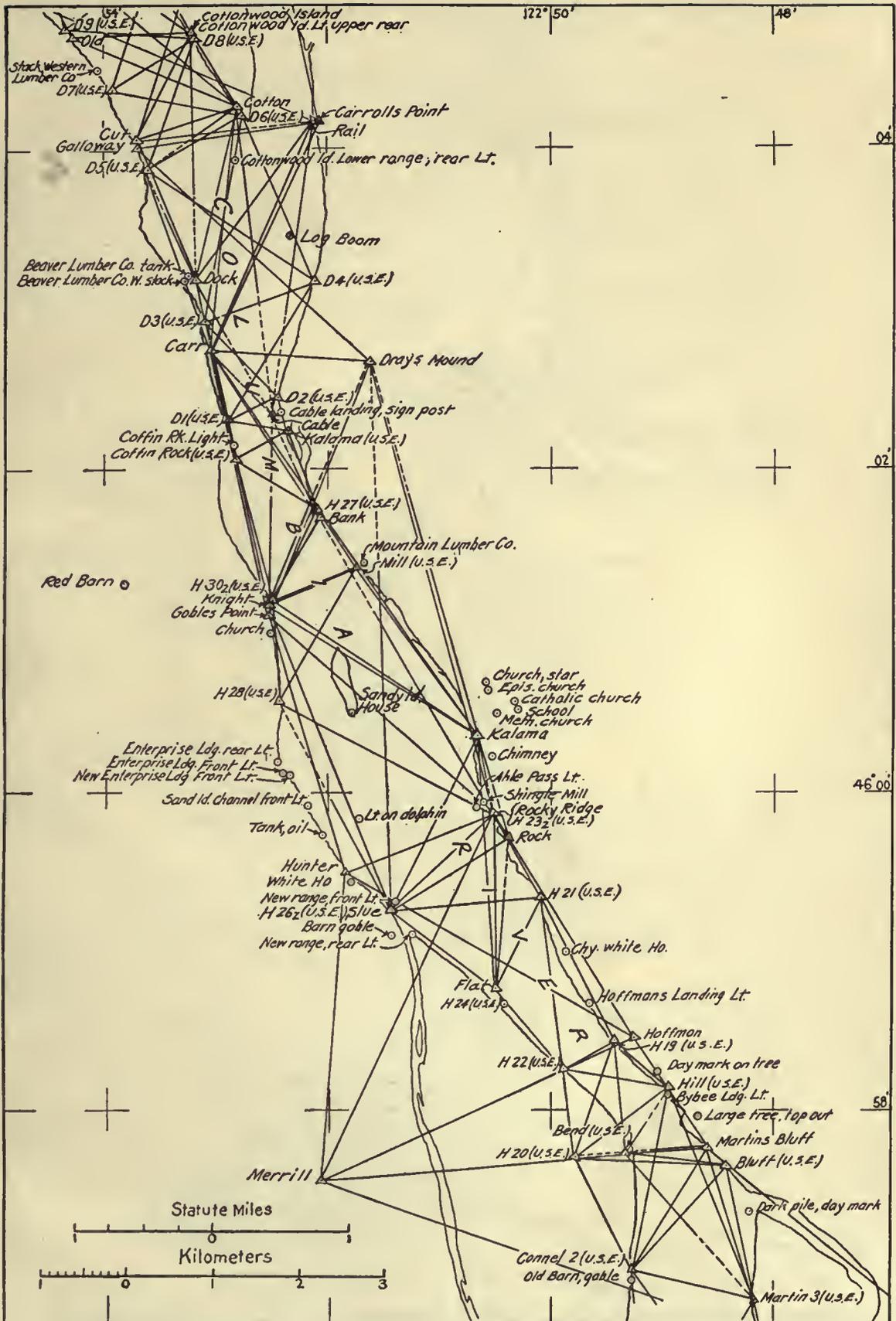


FIG. 16.—TRIANGULATION, COLUMBIA RIVER, COTTONWOOD ISLAND TO MARTIN ISLAND.

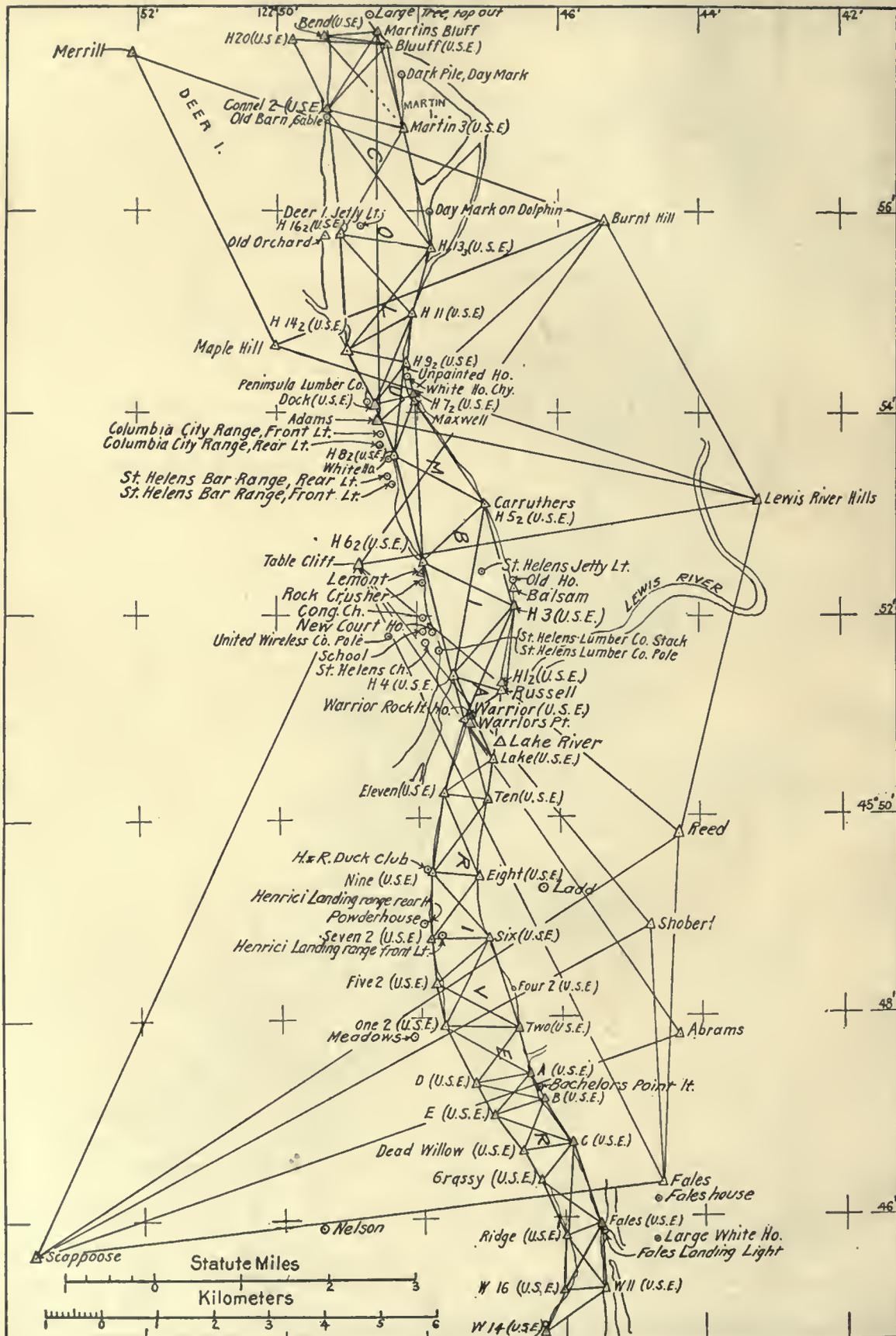


FIG. 17.—TRIANGULATION, COLUMBIA RIVER, MARTIN ISLAND TO FALES LANDING.

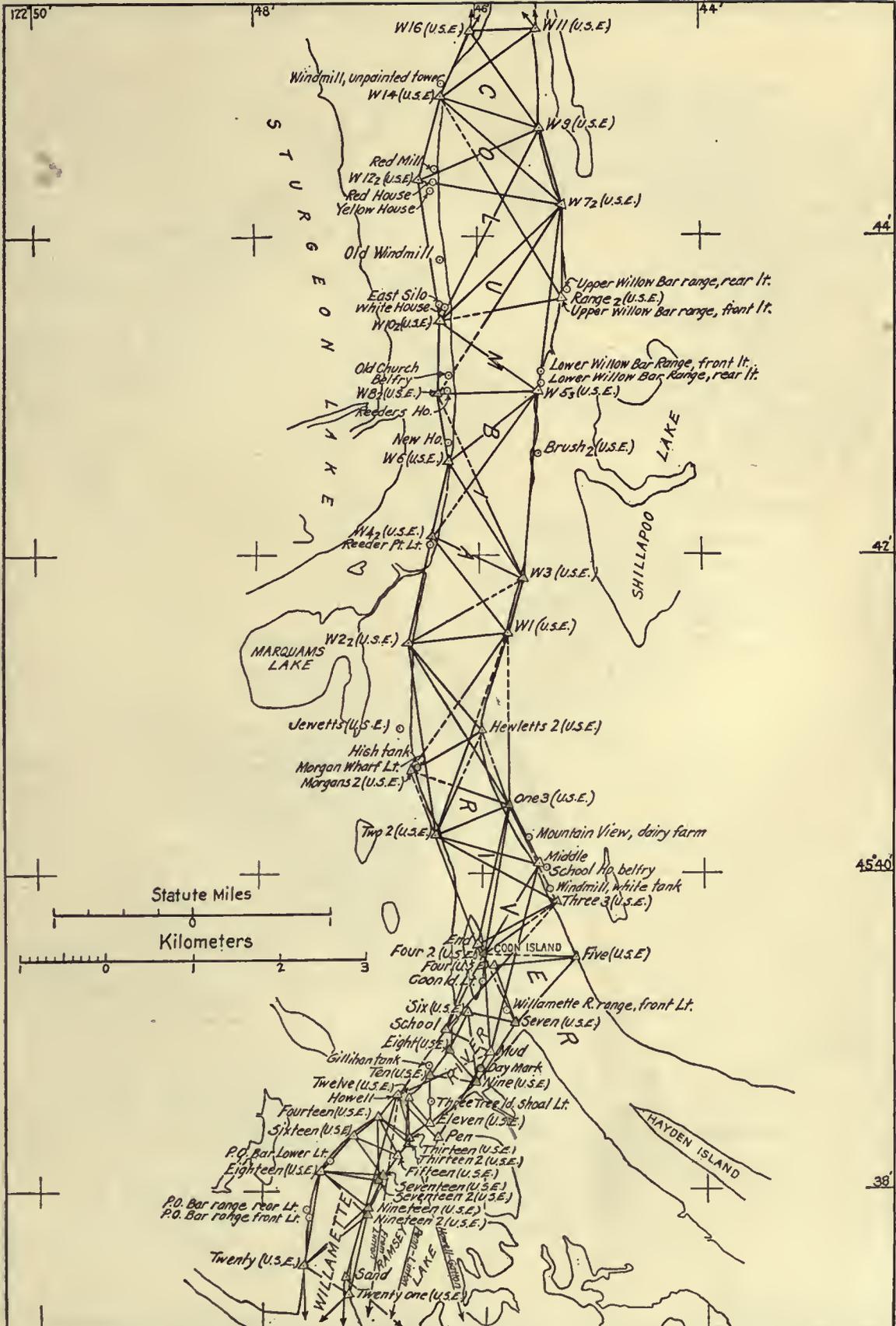


FIG. 18.—TRIANGULATION, COLUMBIA RIVER, FALES LANDING TO WILLAMETTE RIVER.

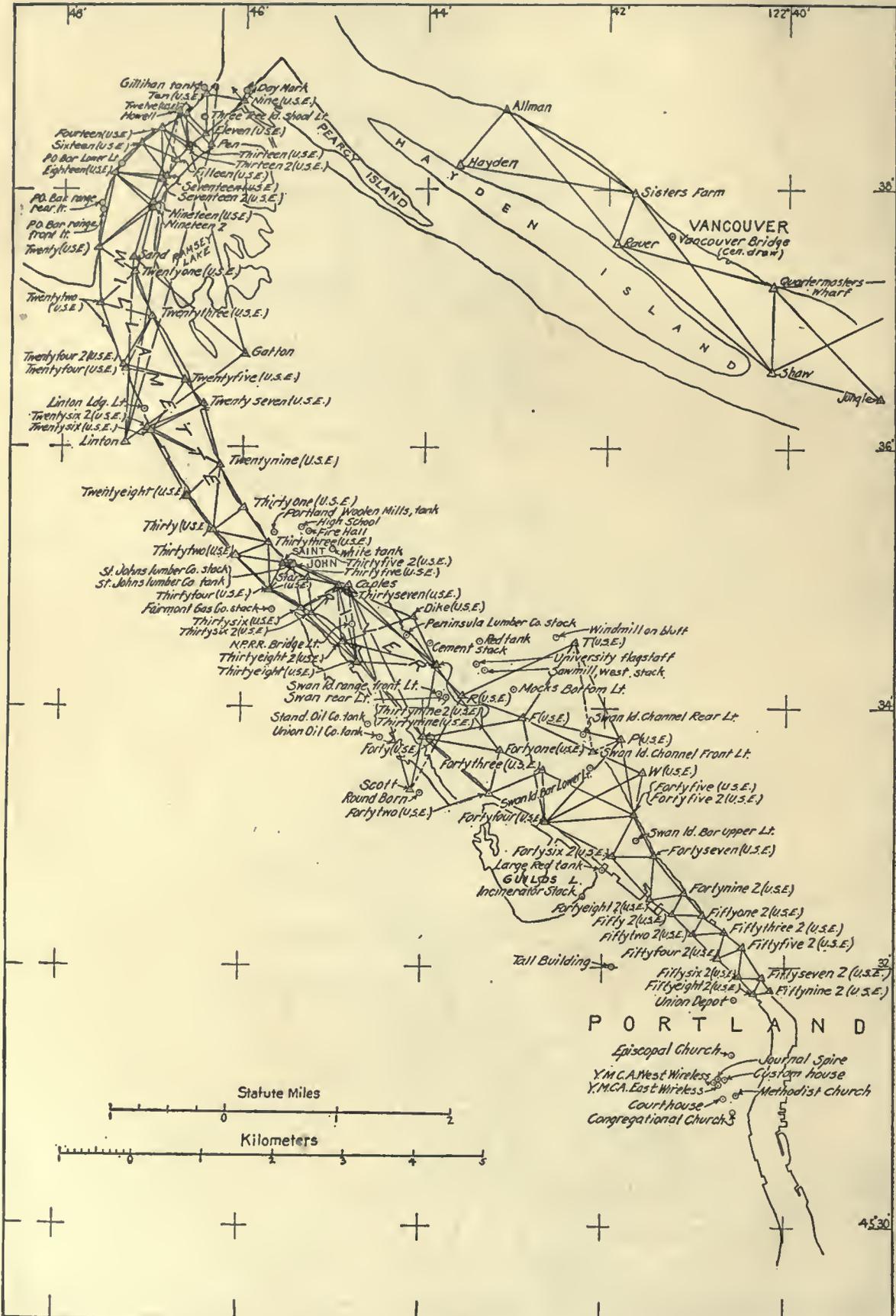


FIG. 19.—TRIANGULATION, MOUTH OF THE WILLAMETTE RIVER TO PORTLAND.

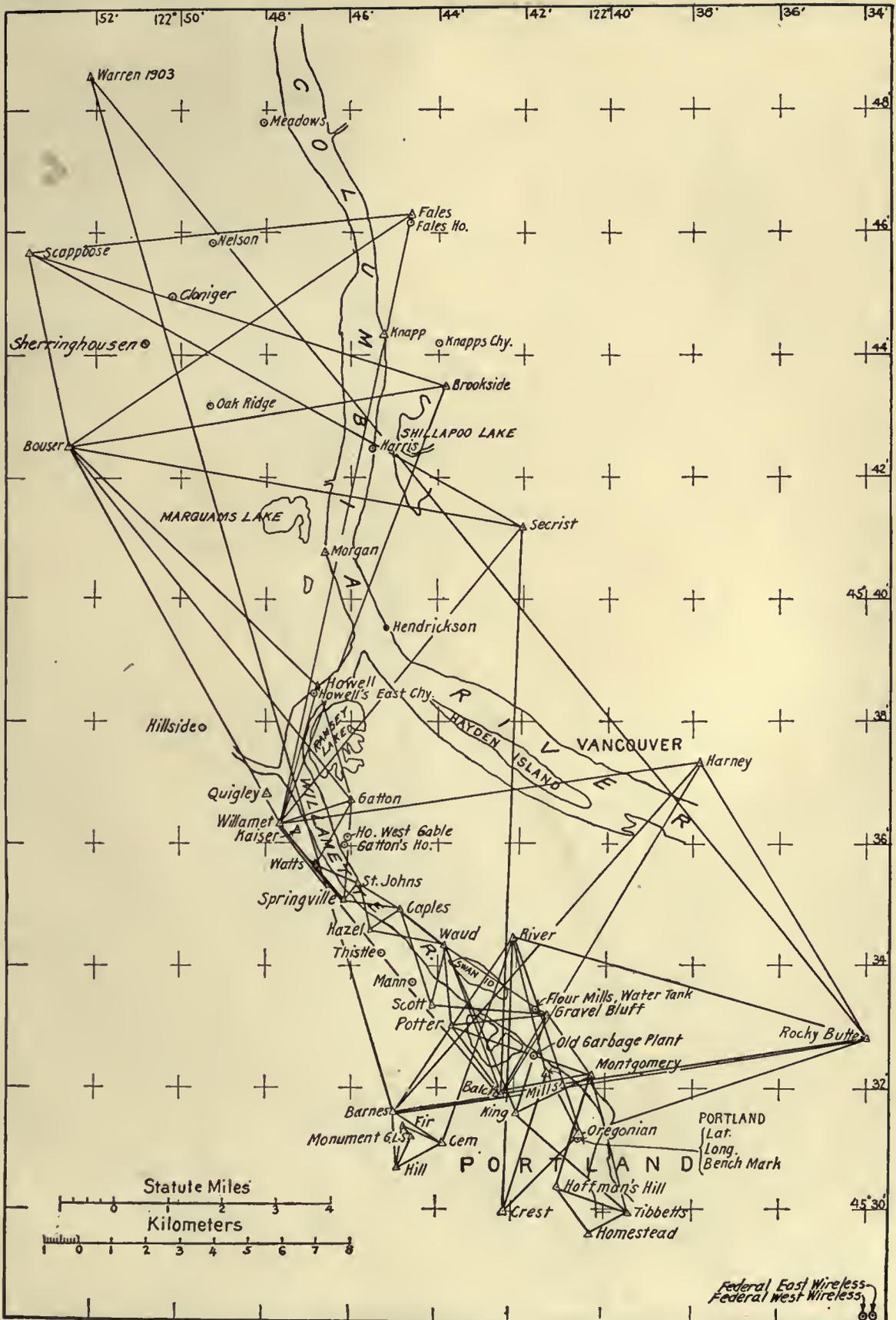


FIG. 20.—TRIANGULATION, FALES LANDING TO PORTLAND.

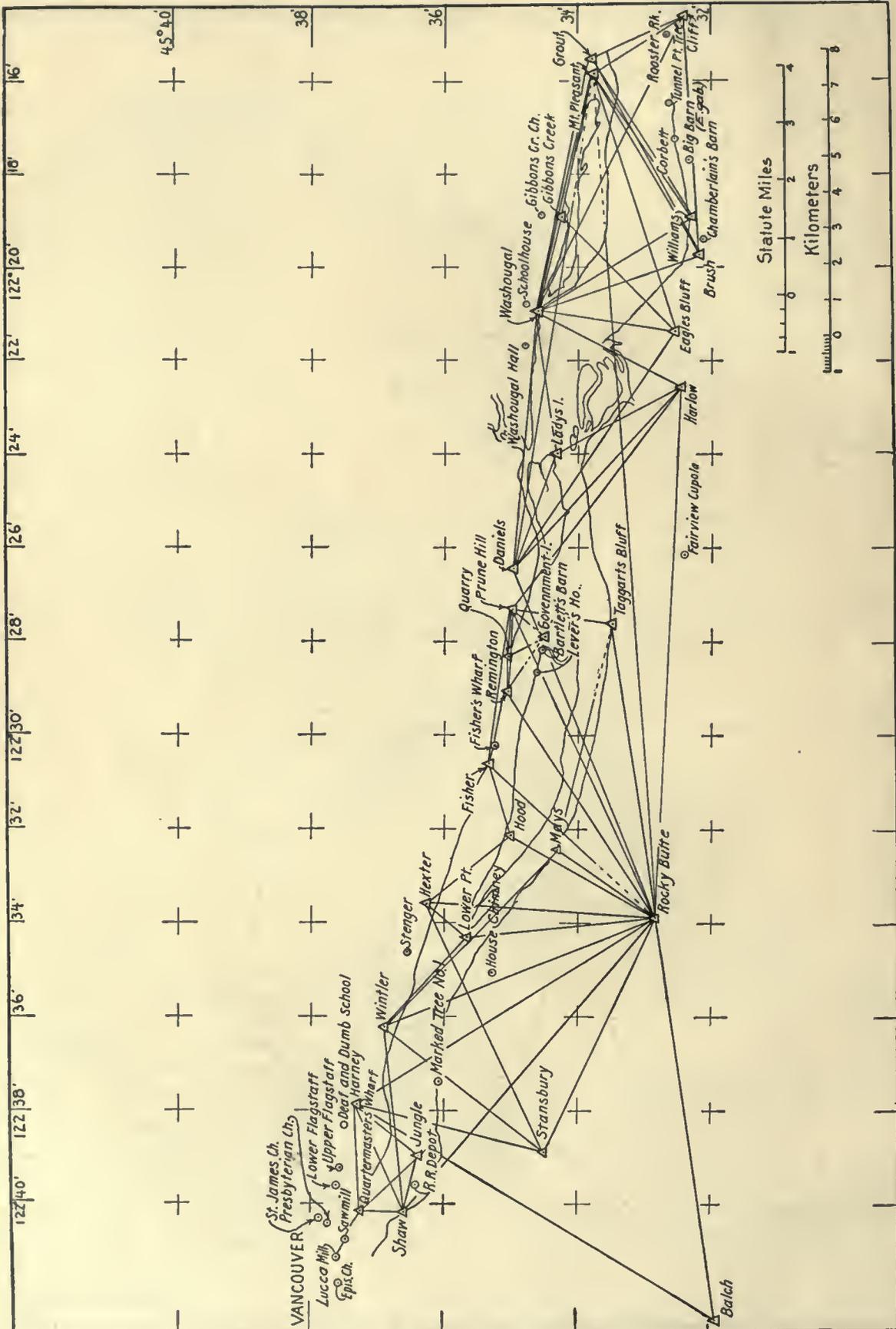


FIG. 21.—TRIANGULATION, COLUMBIA RIVER, VANCOUVER TO MOUNT PLEASANT.

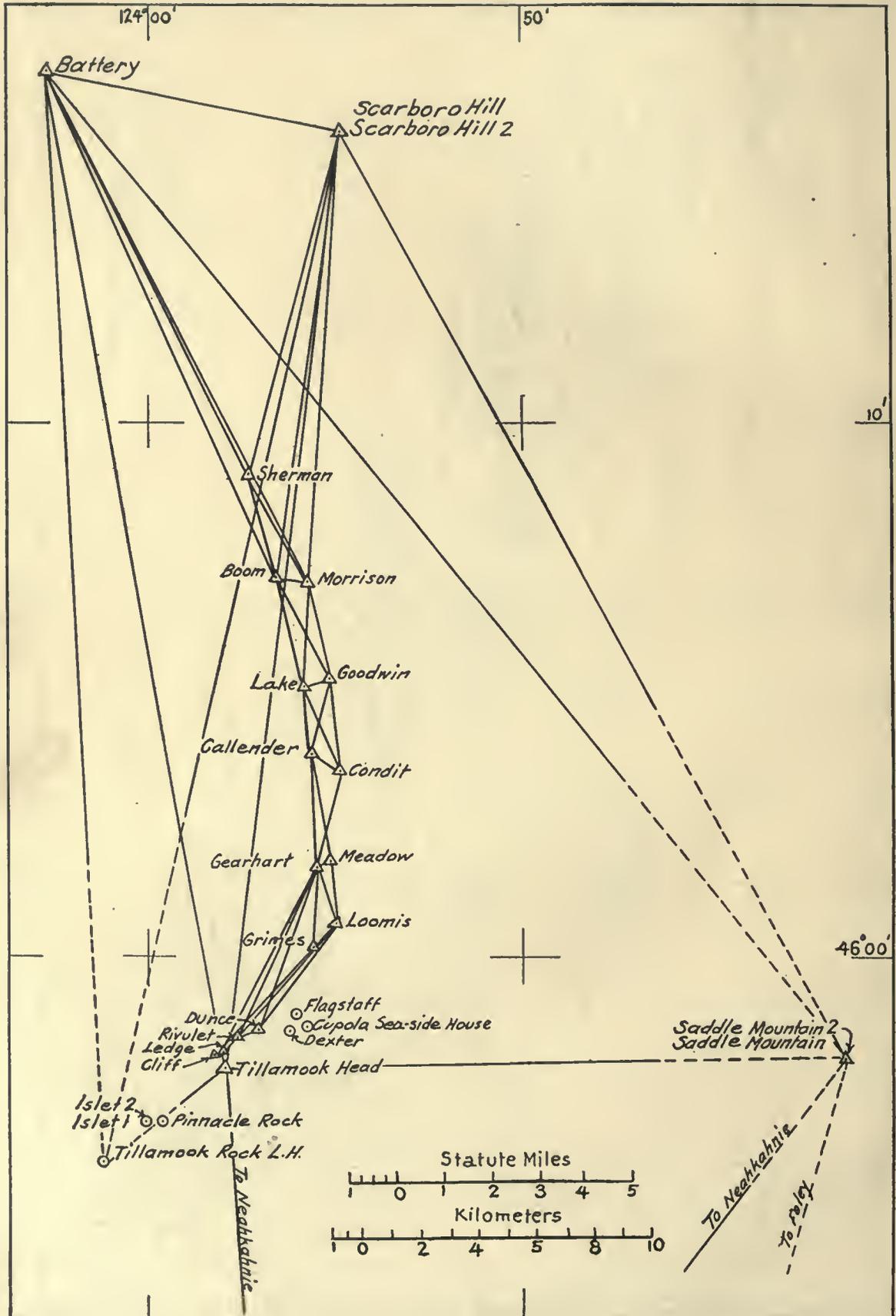


FIG. 23.—TRIANGULATION, MOUTH OF THE COLUMBIA RIVER TO TILLAMOOK LIGHTHOUSE.

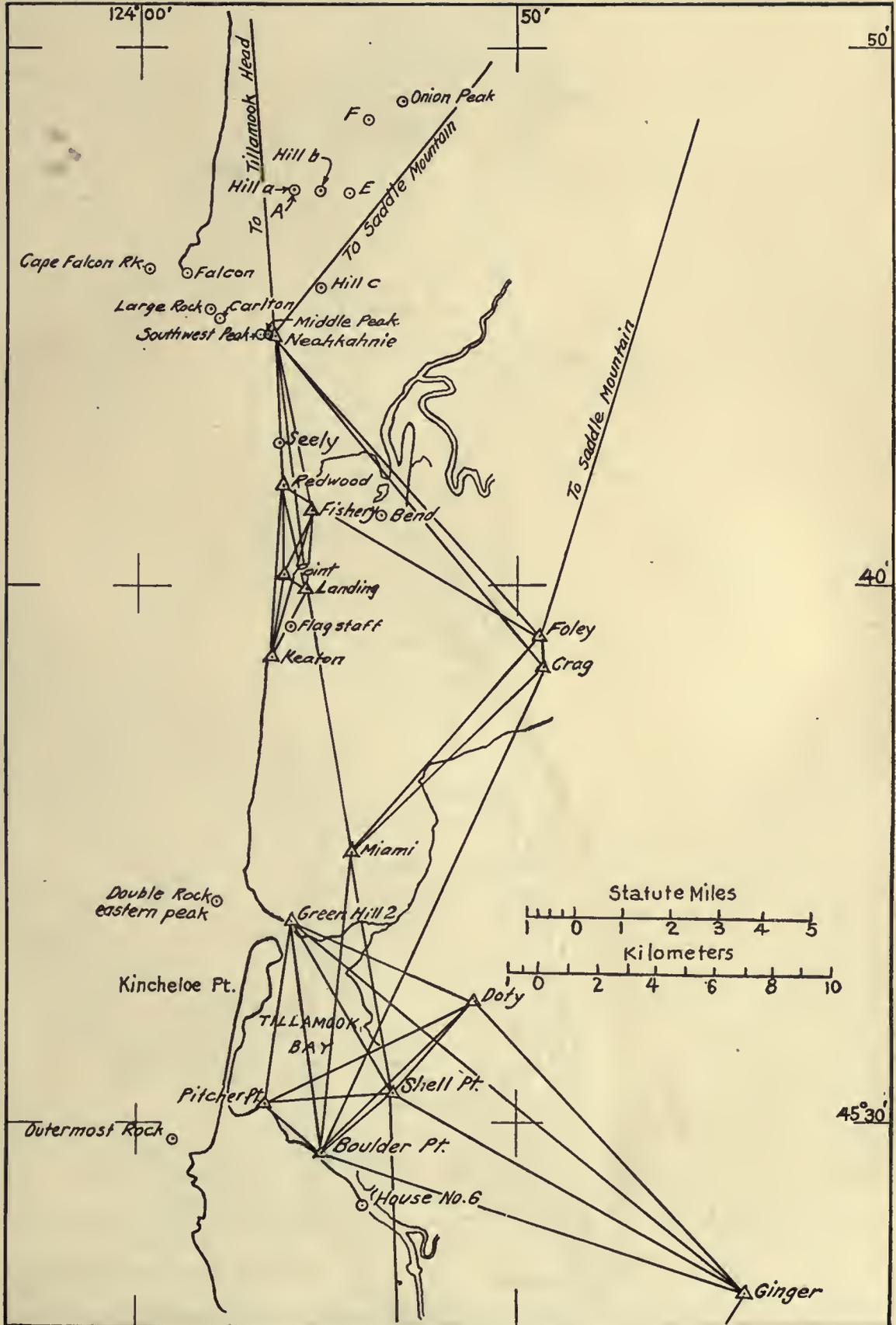


FIG. 24.—TRIANGULATION, TILLAMOOK LIGHTHOUSE TO TILLAMOOK BAY.

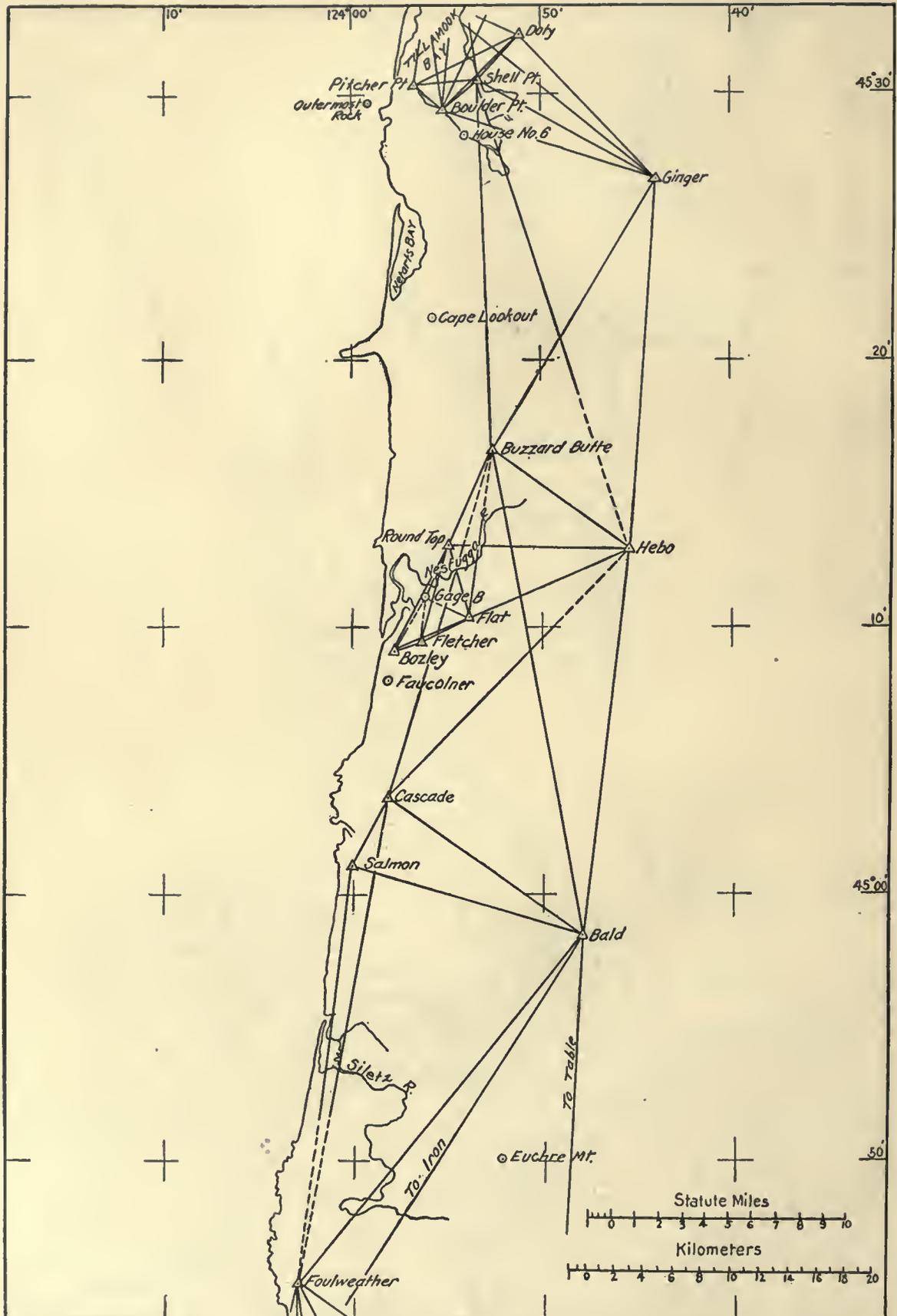


FIG. 25.—TRIANGULATION, TILLAMOOK BAY TO SILETZ RIVER.

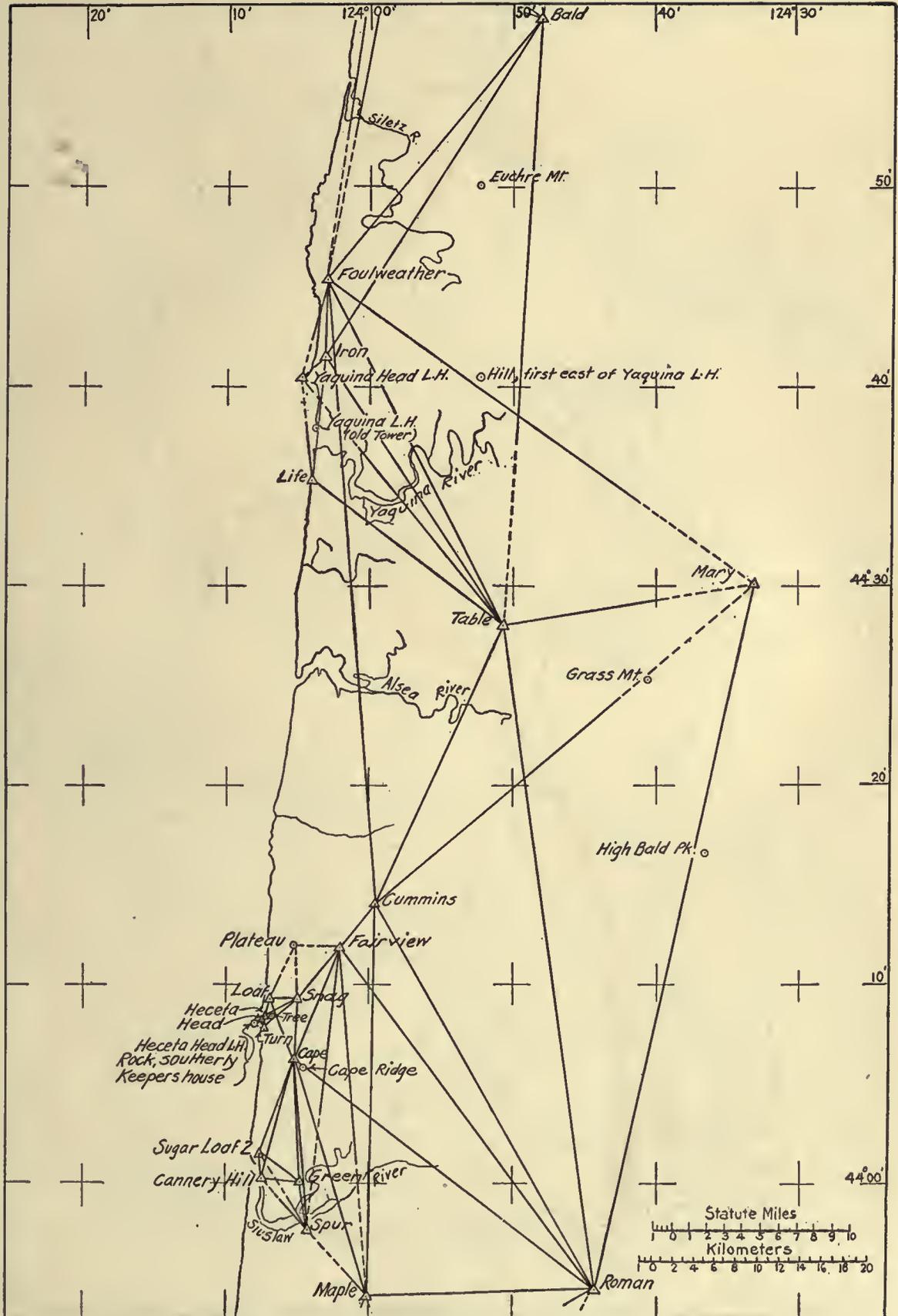


FIG. 26.—TRIANGULATION, SILETZ RIVER TO SIUSLAW RIVER.

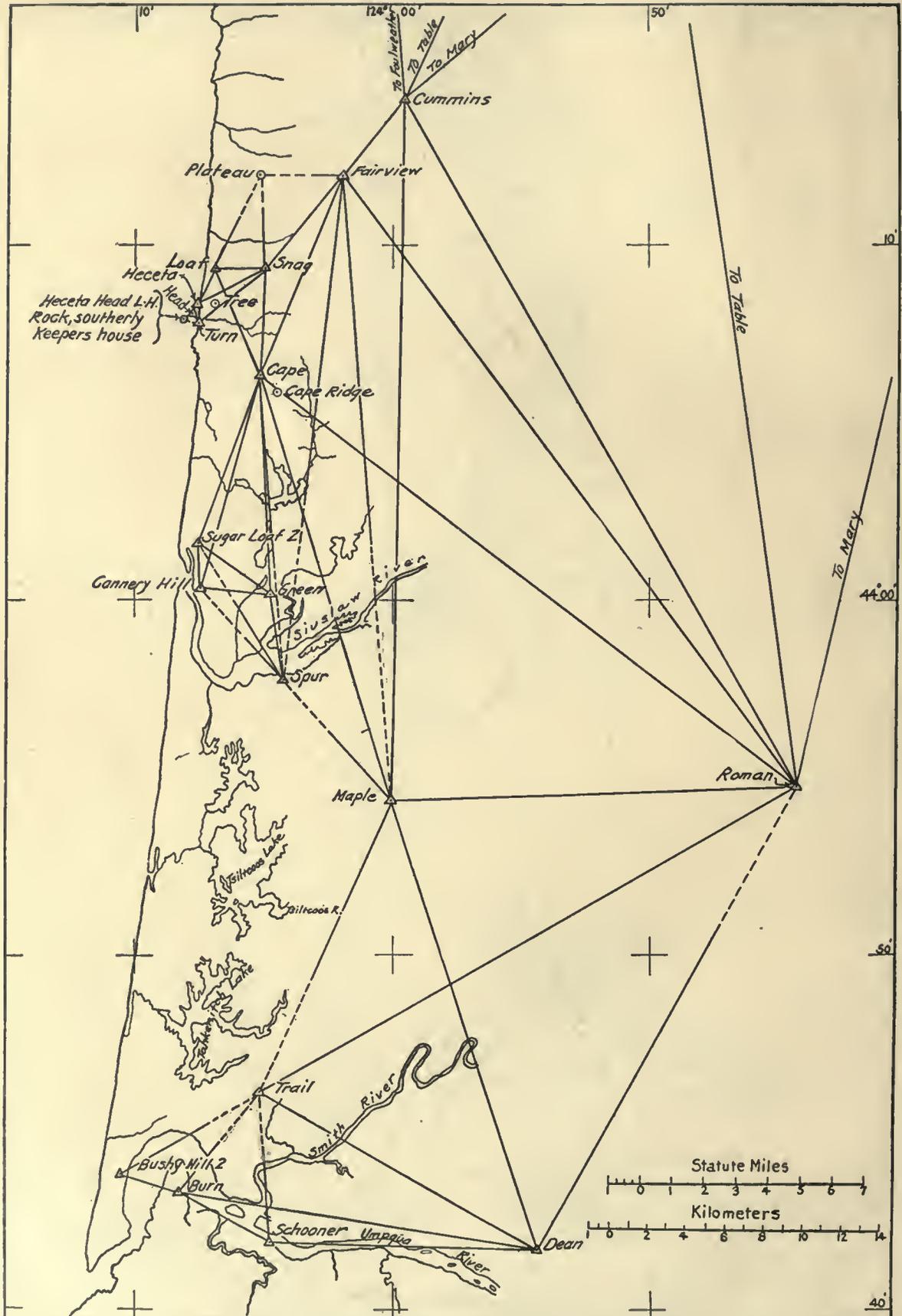


FIG. 27.—TRIANGULATION, HECETA HEAD TO UMPQUA RIVER.

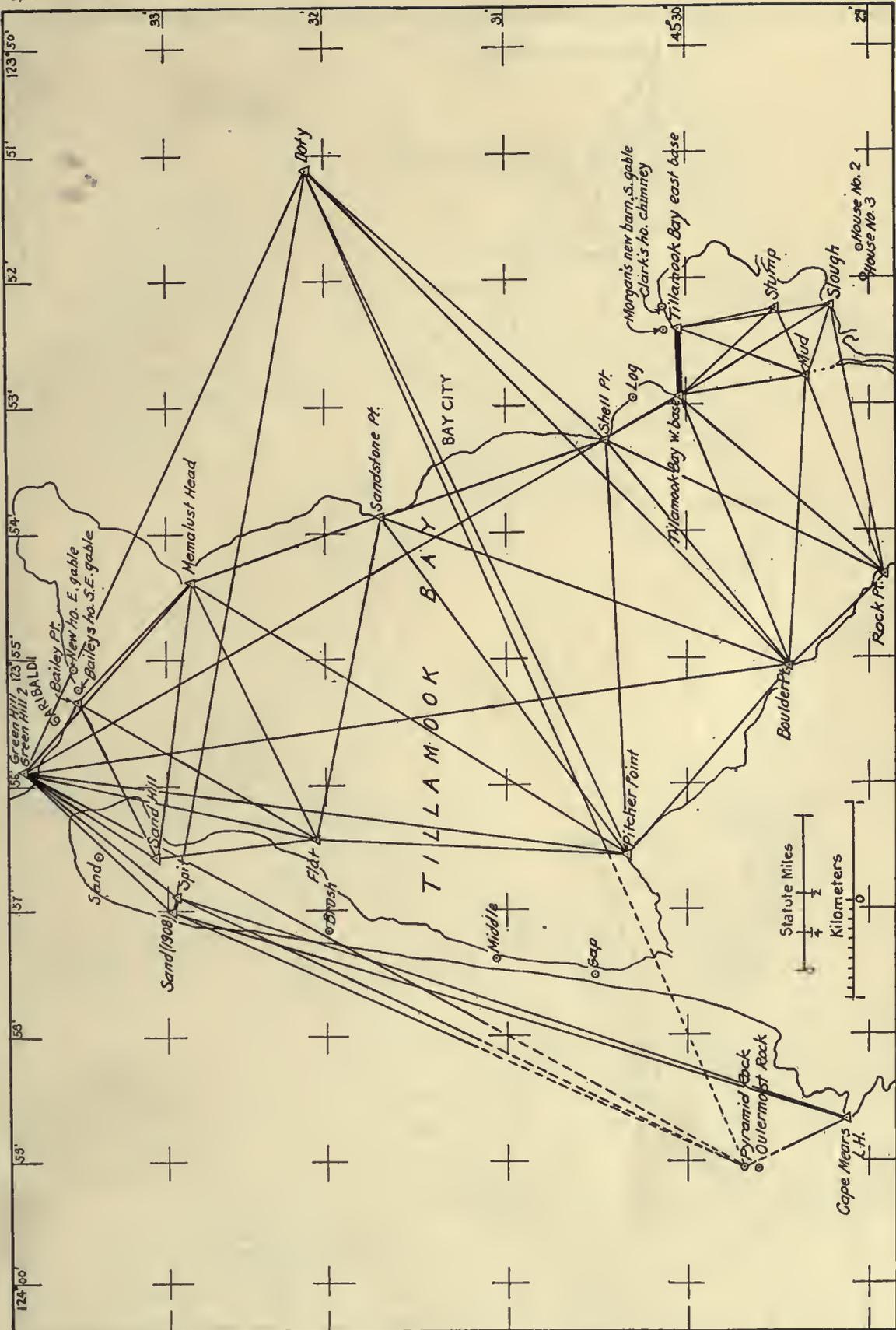


FIG. 28.—TRIANGULATION, TILLAMOOK BAY.

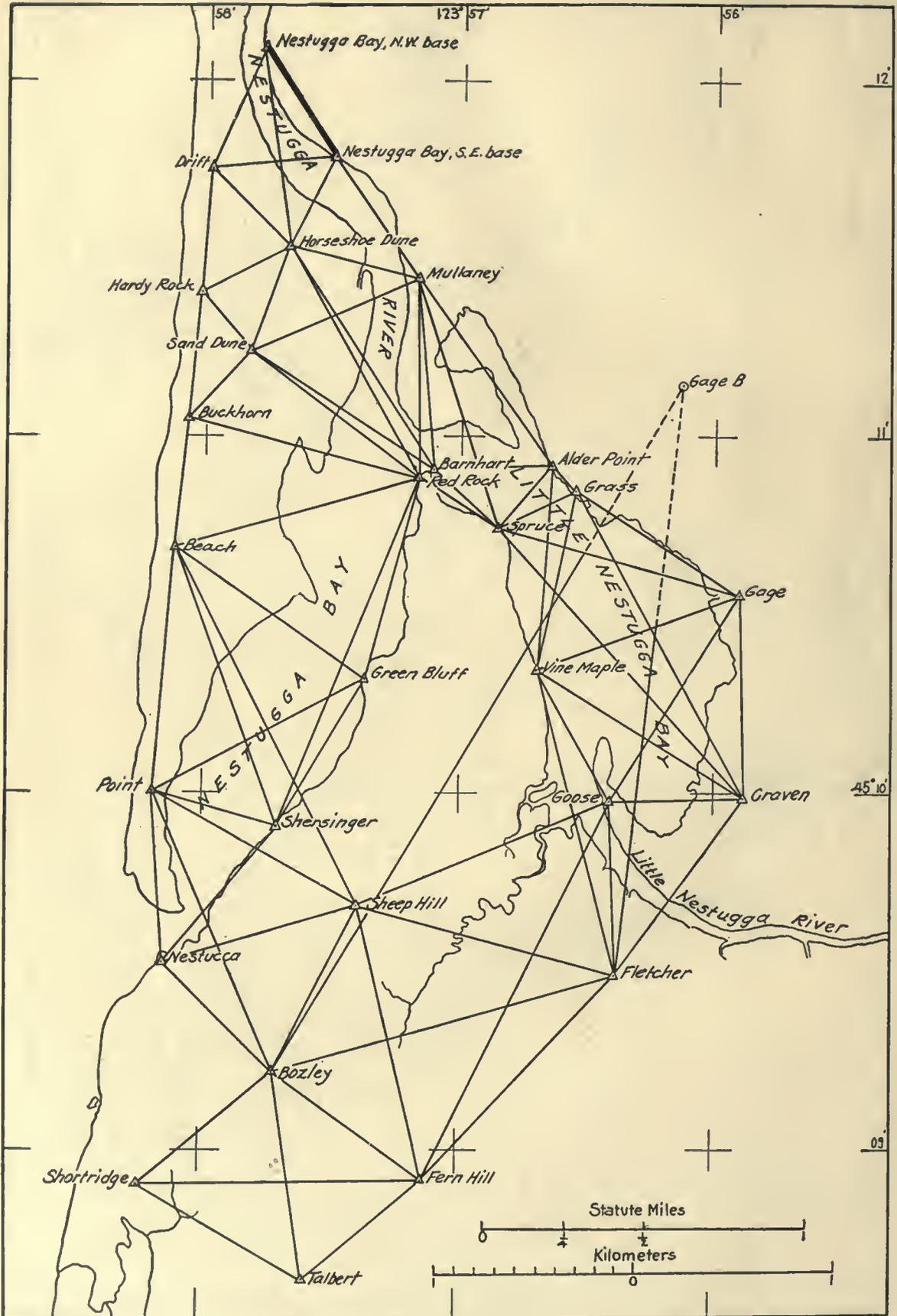


FIG. 29.—TRIANGULATION, NESTUGGA BAY.

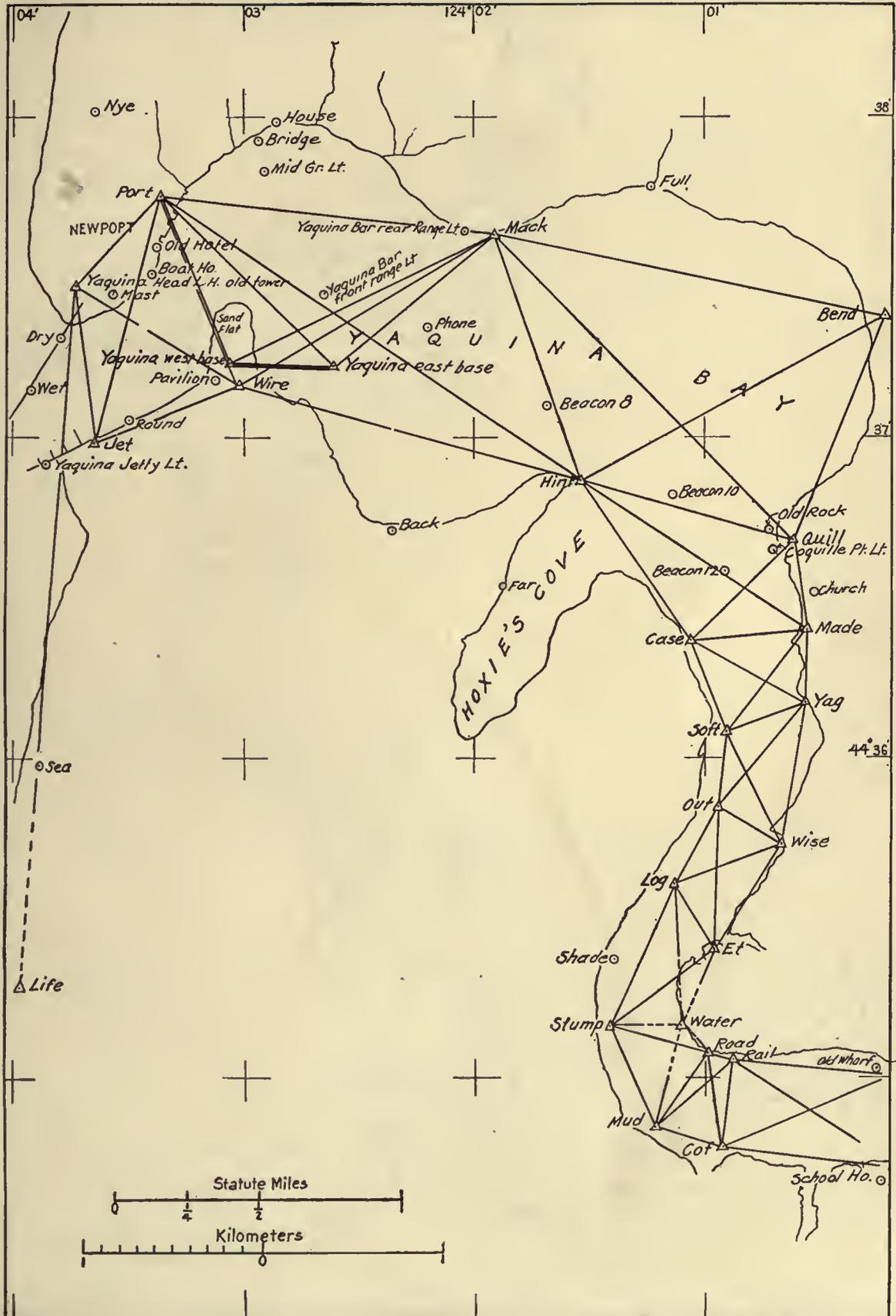


FIG. 30.—TRIANGULATION, YAQUINA RIVER FROM THE MOUTH TO THE LINE CAF-RAIL.

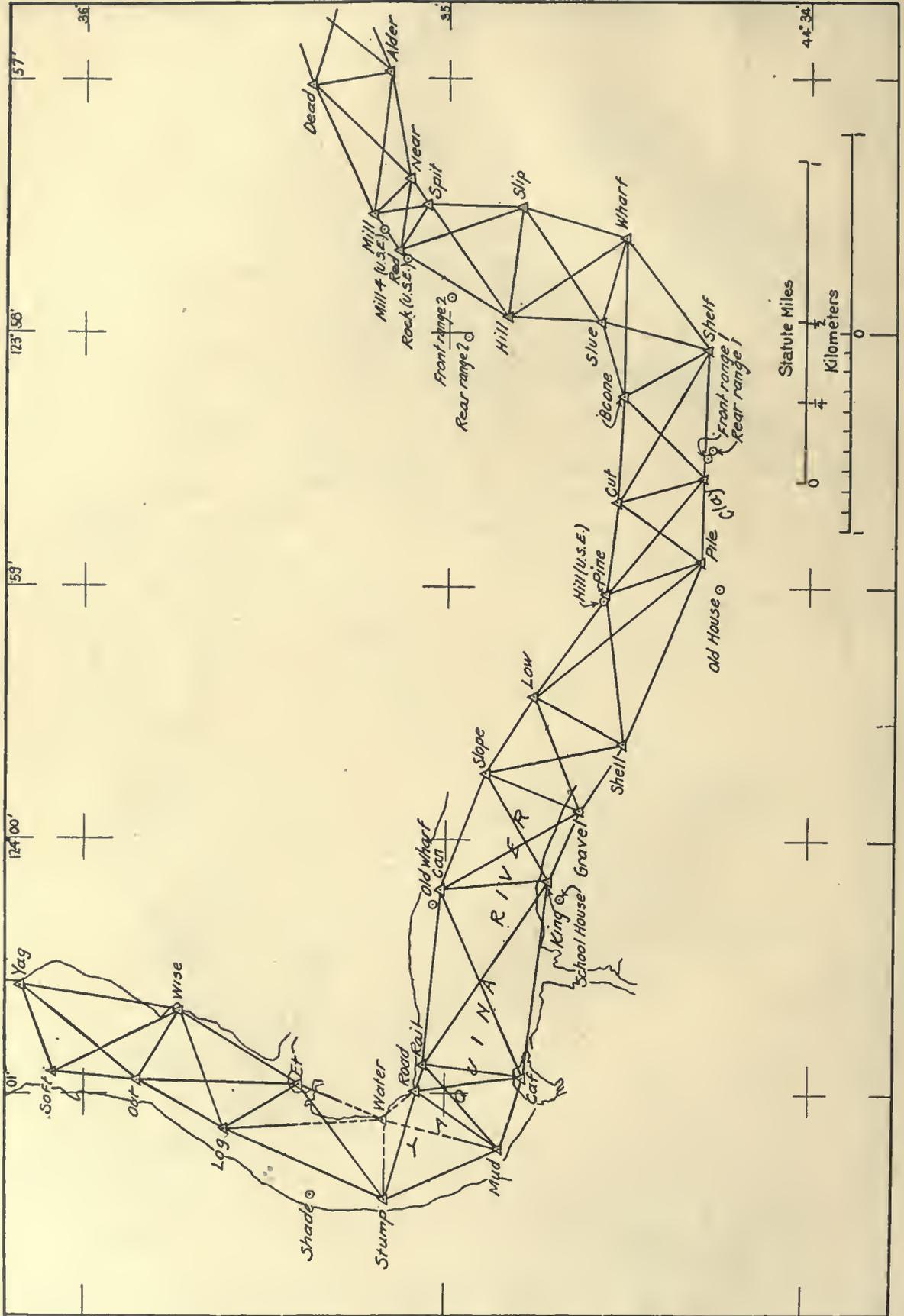


FIG. 31.—TRIANGULATION, YAQUINA RIVER, FROM THE LINE SOFT-YAQ TO THE LINE DEAD-ALDER.

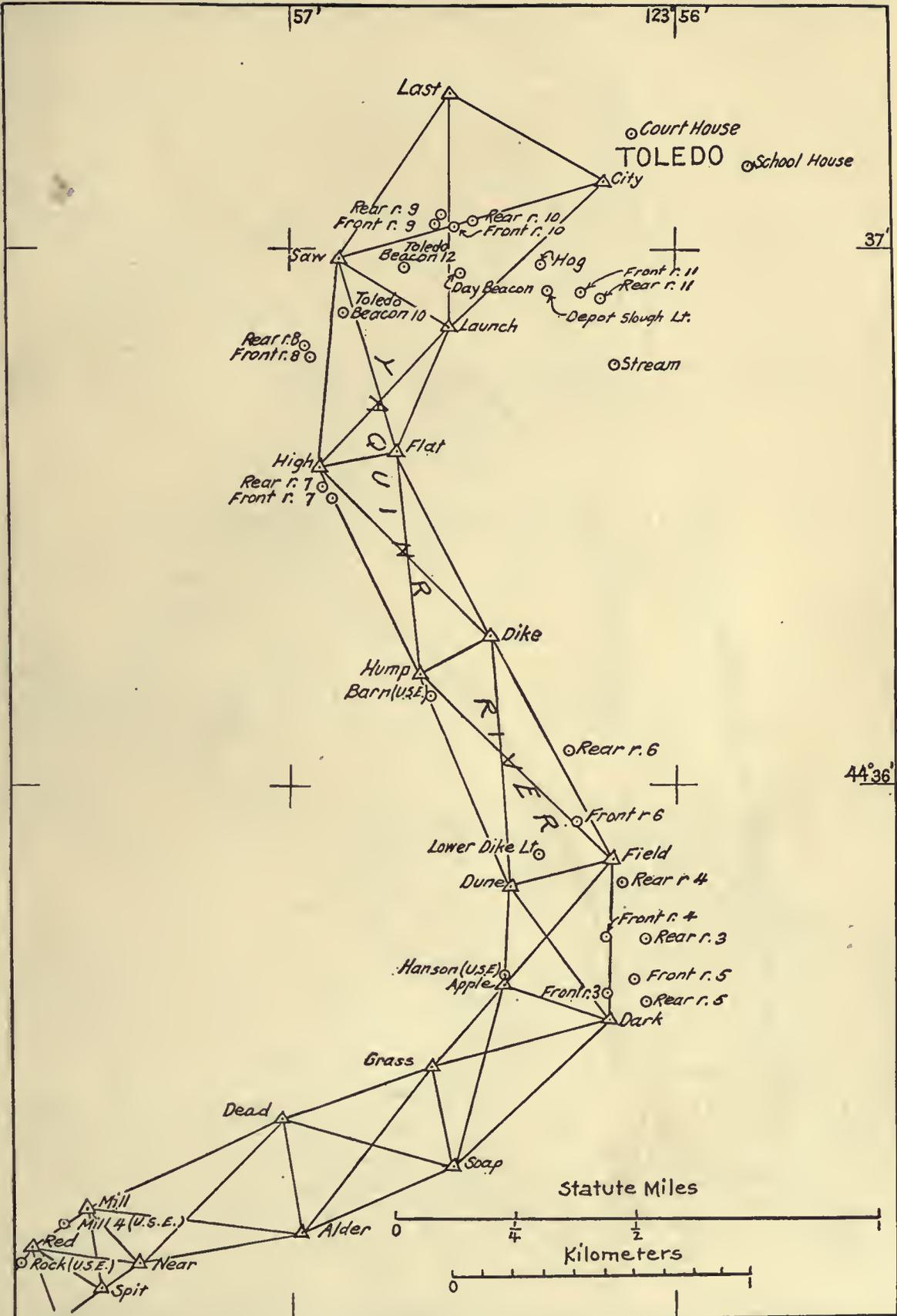


FIG. 32.—TRIANGULATION, YAQUINA RIVER, FROM THE LINE SPIT-RED TO TOLEDO.

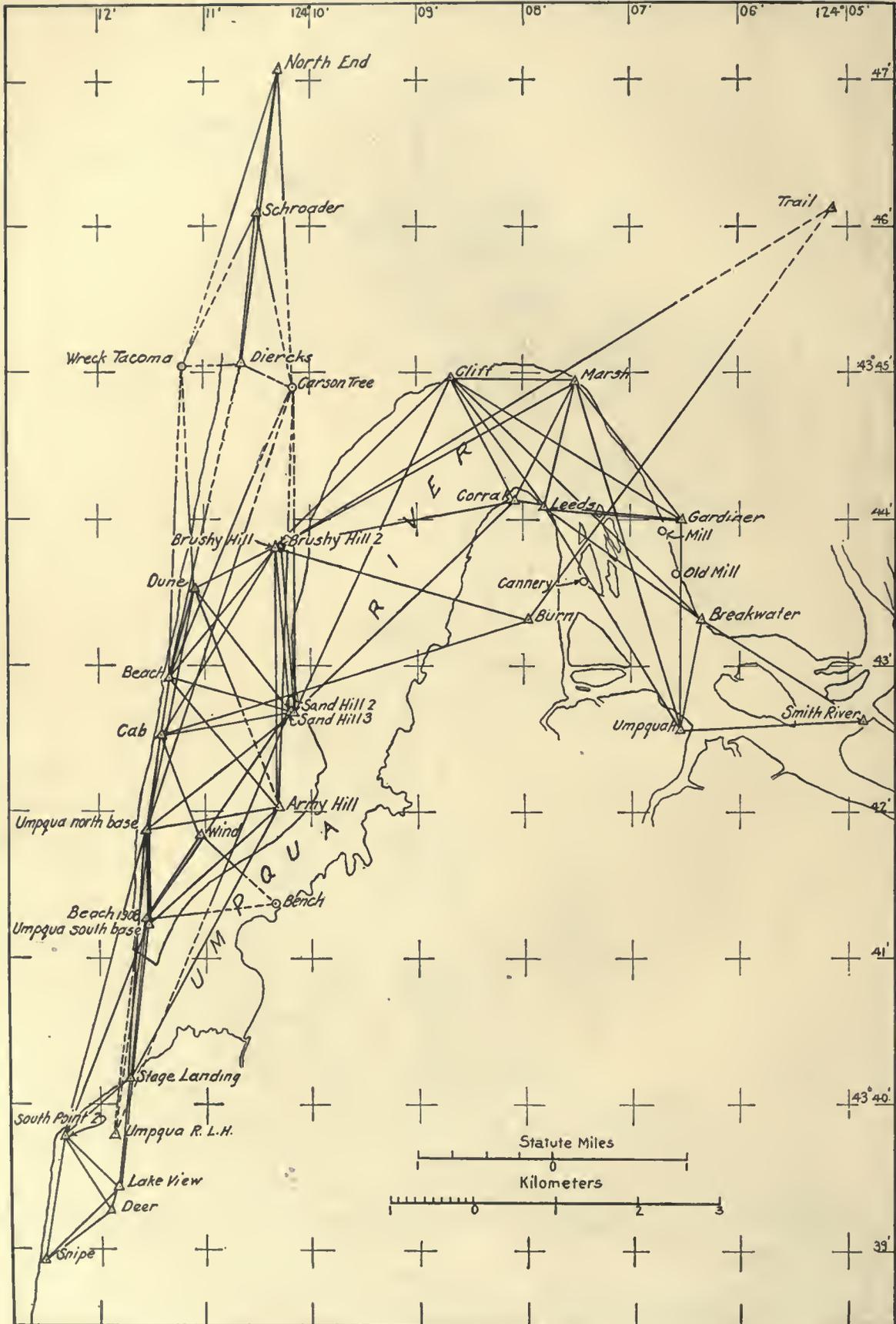


FIG. 33.—TRIANGULATION, UMPQUA RIVER.

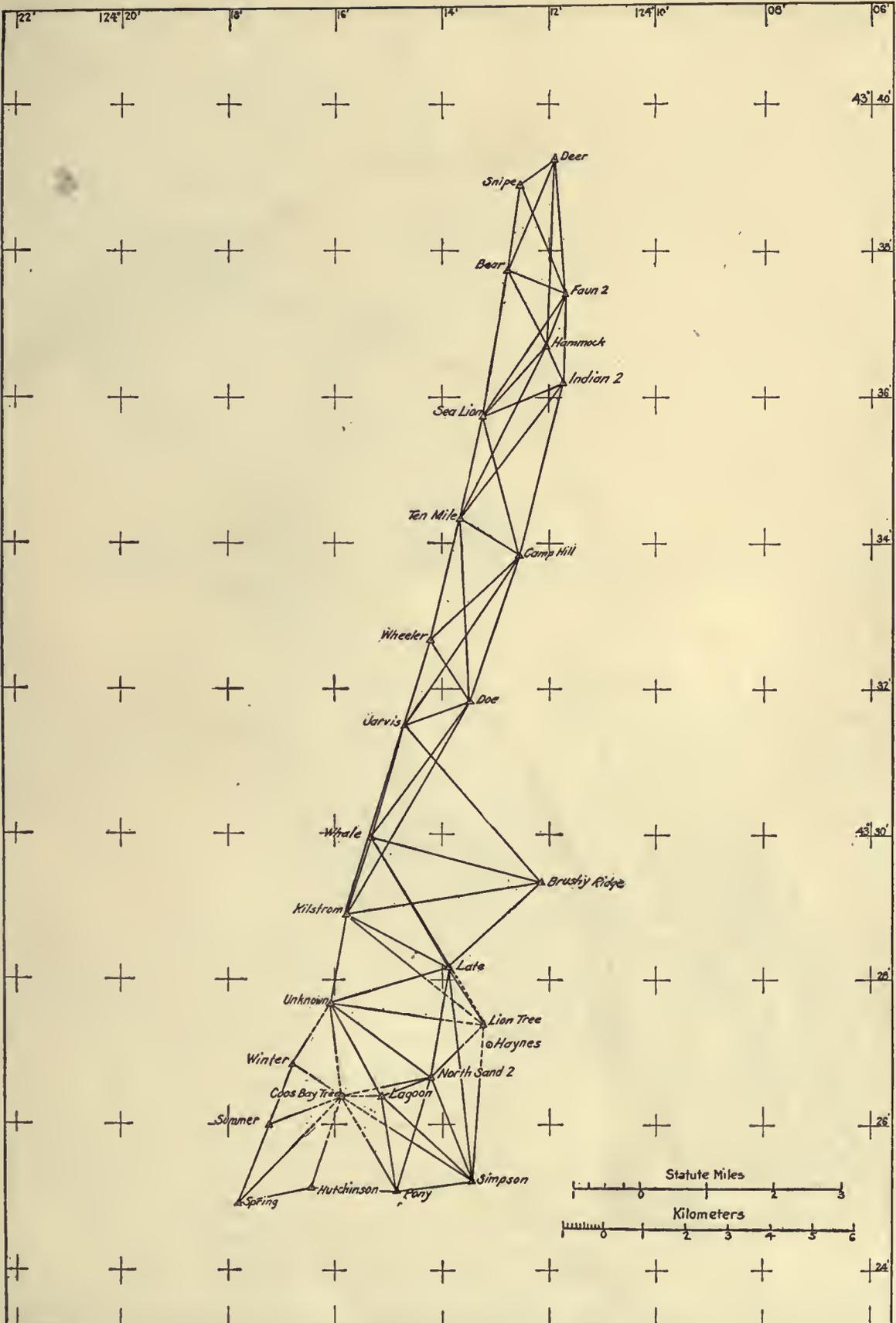


FIG. 34.—TRIANGULATION, UMPQUA RIVER TO COOS BAY.

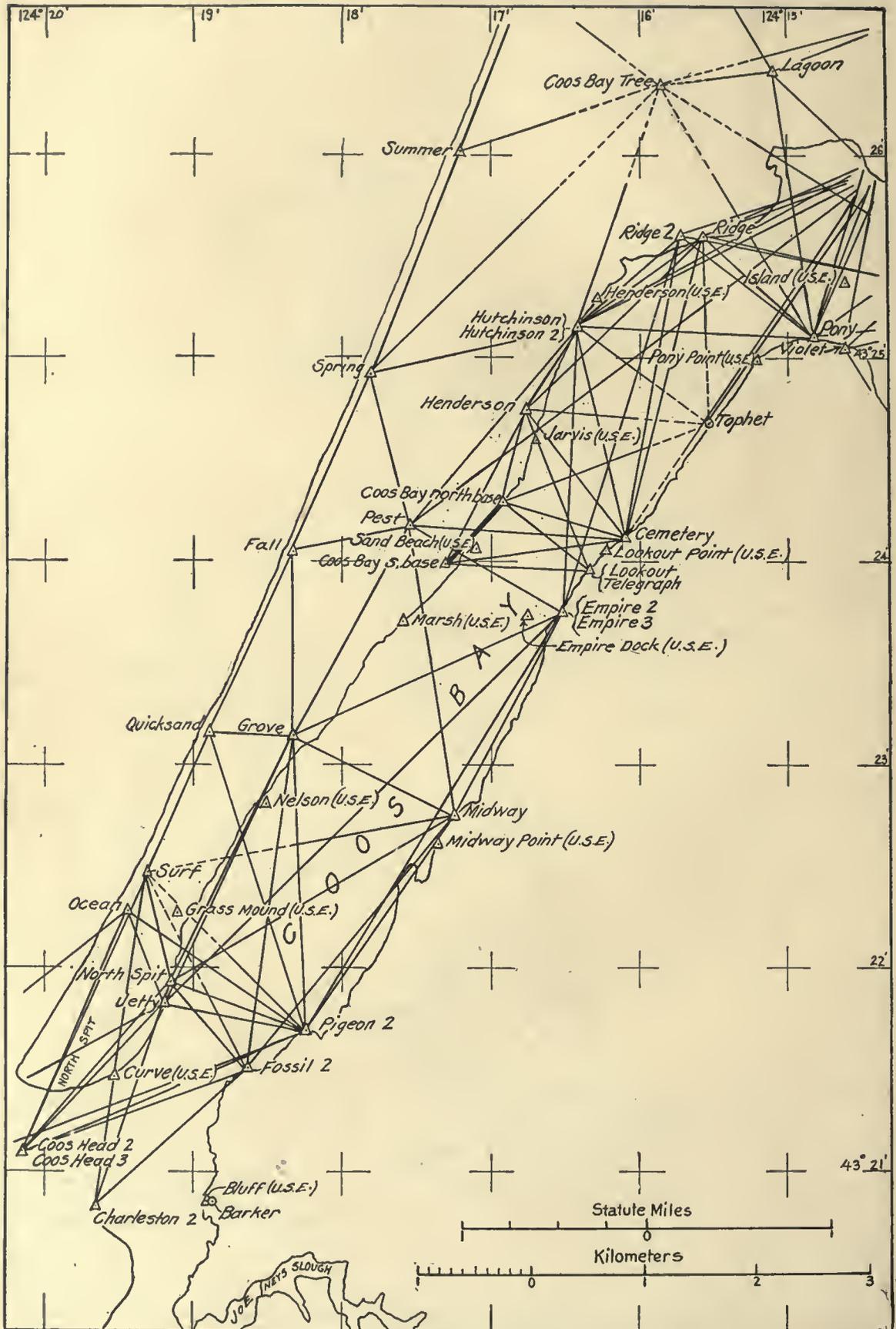


FIG. 35.—TRIANGULATION, COOS BAY, WESTERN HALF.

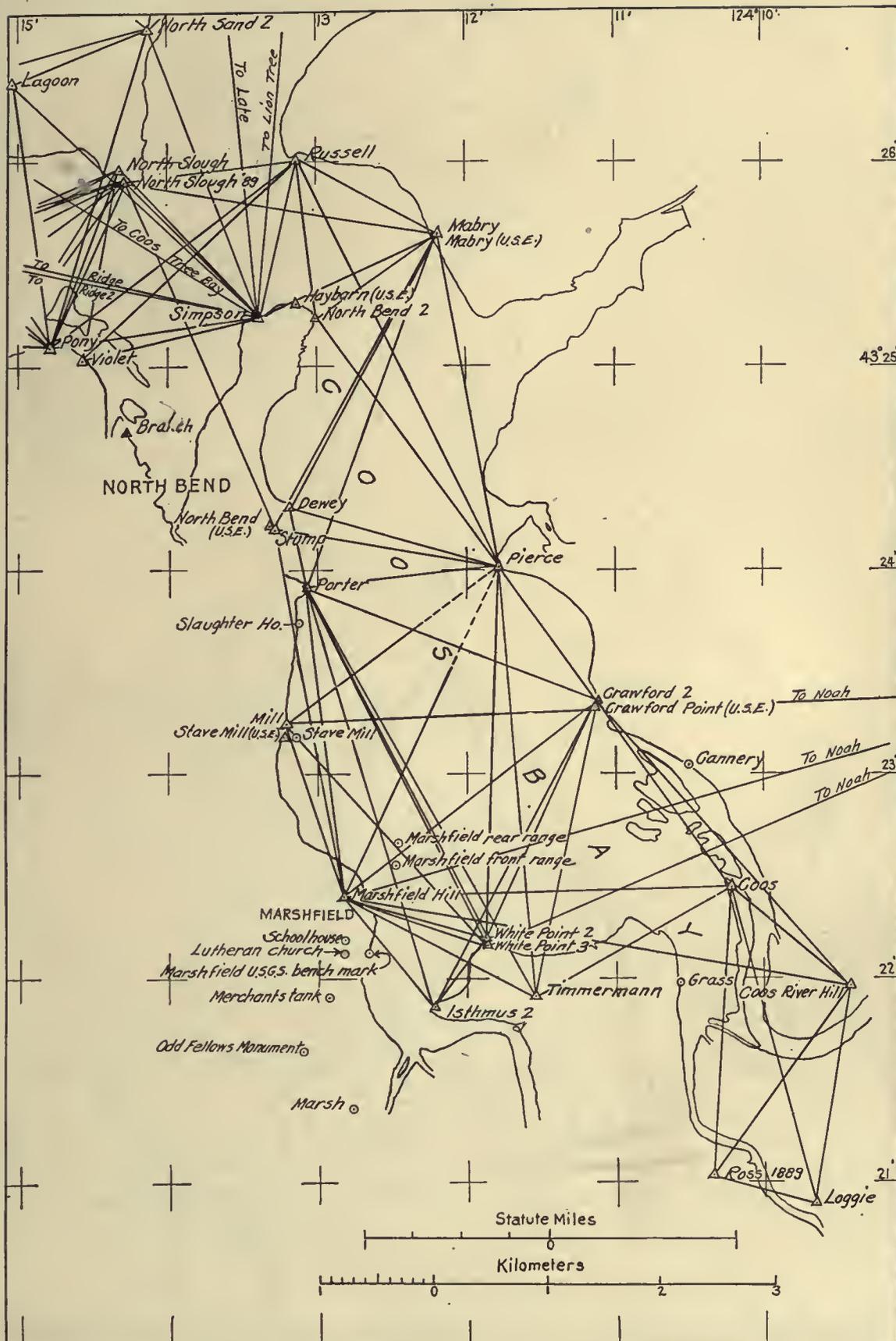


FIG. 36.—TRIANGULATION, COOS BAY, EASTERN HALF.

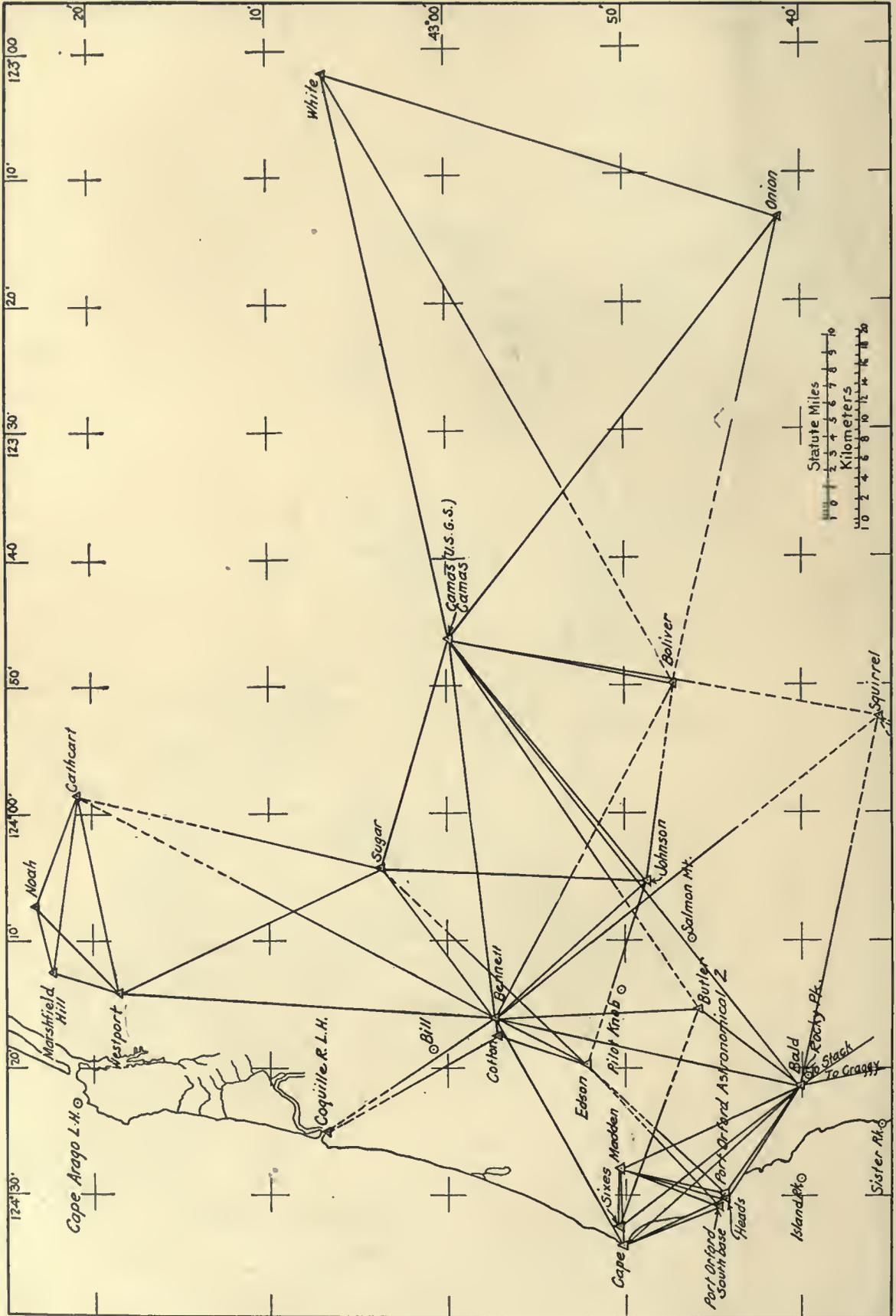


FIG. 37.—TRIANGULATION, COOS BAY TO PORT ORFORD, SHOWING CONNECTION TO THE PRIMARY TRIANGULATION.

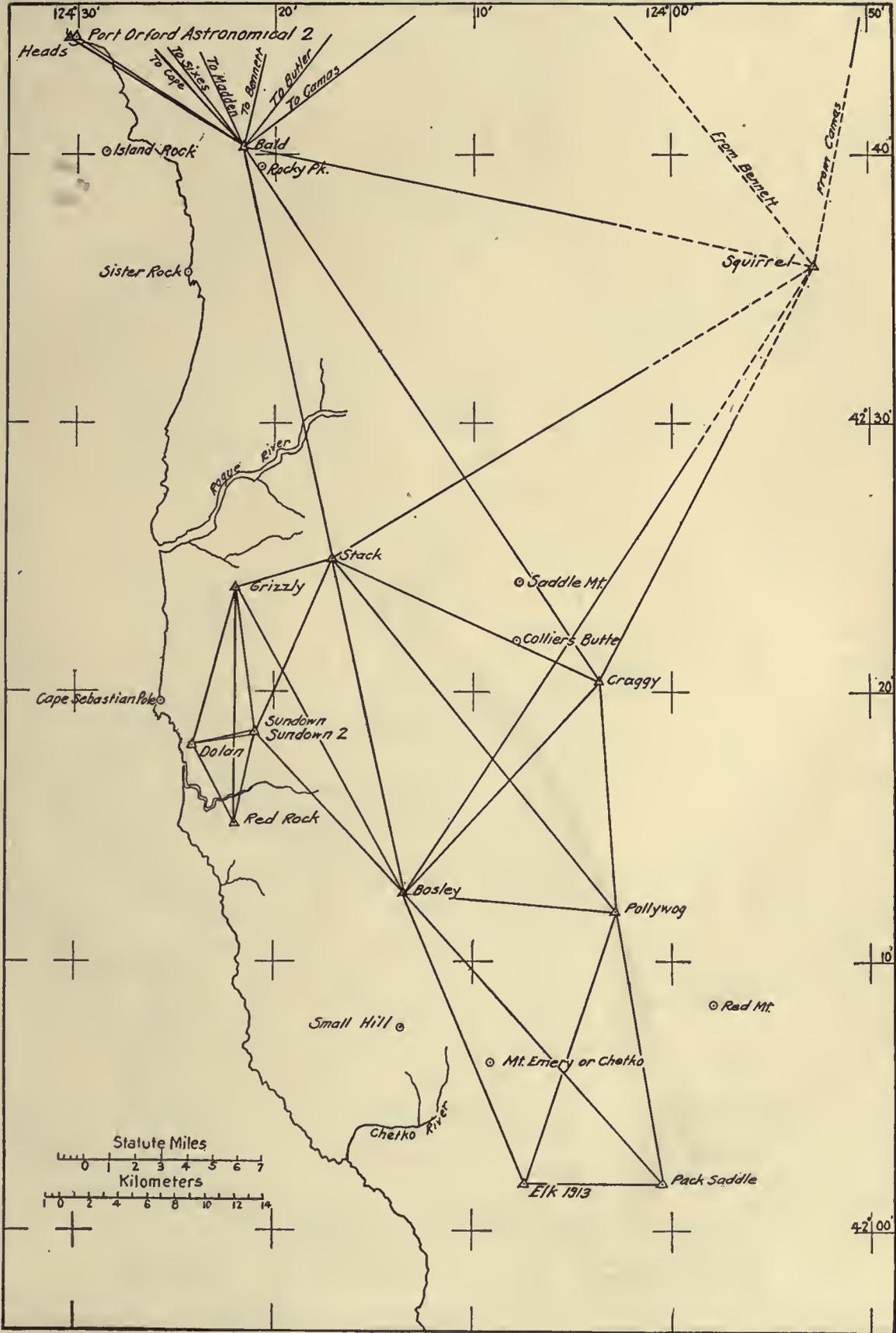


FIG. 38.—TRIANGULATION, PORT ORFORD TO CHETKO RIVER.

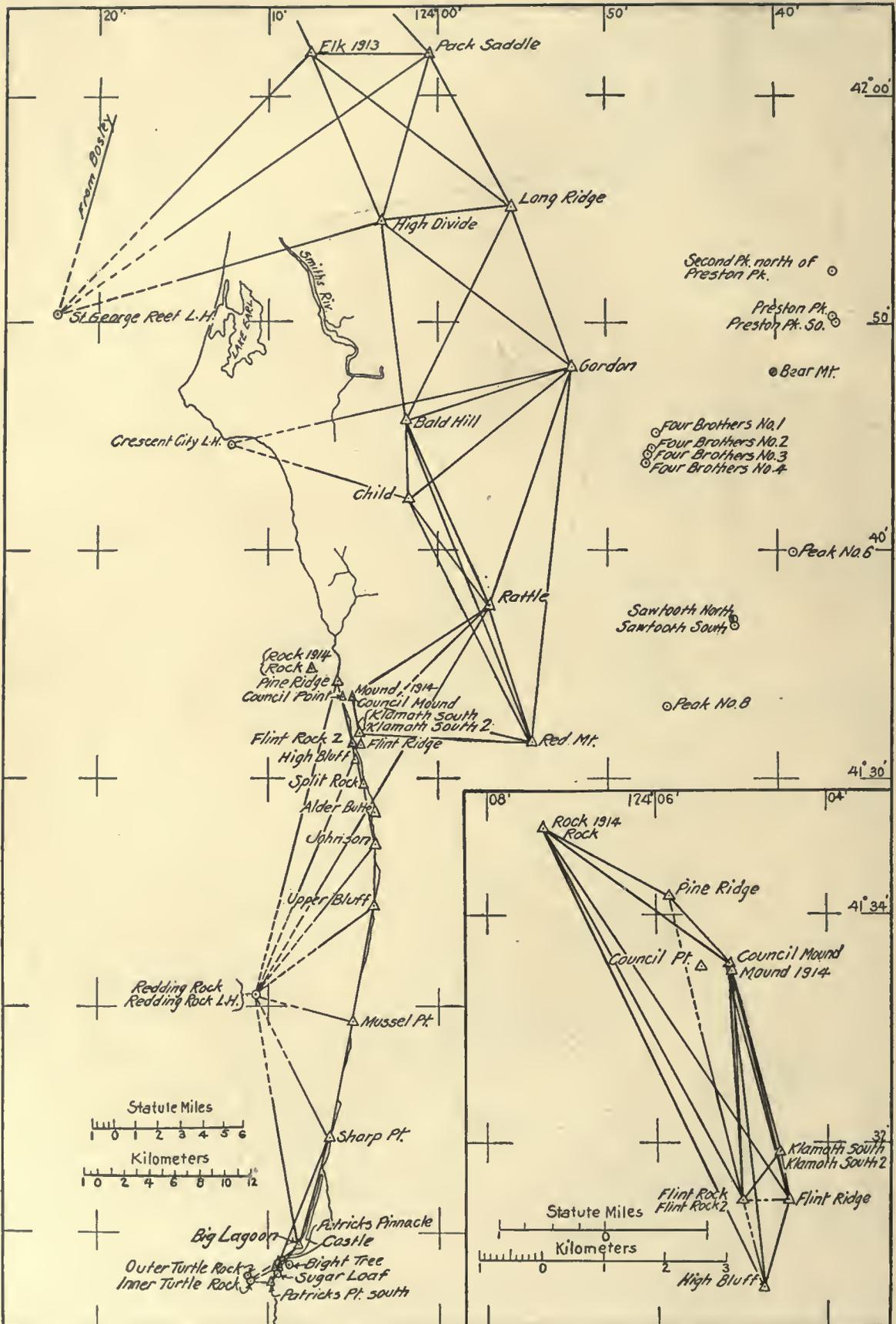


FIG. 39.—TRIANGULATION, CHETKO RIVER TO TRINIDAD HEAD.

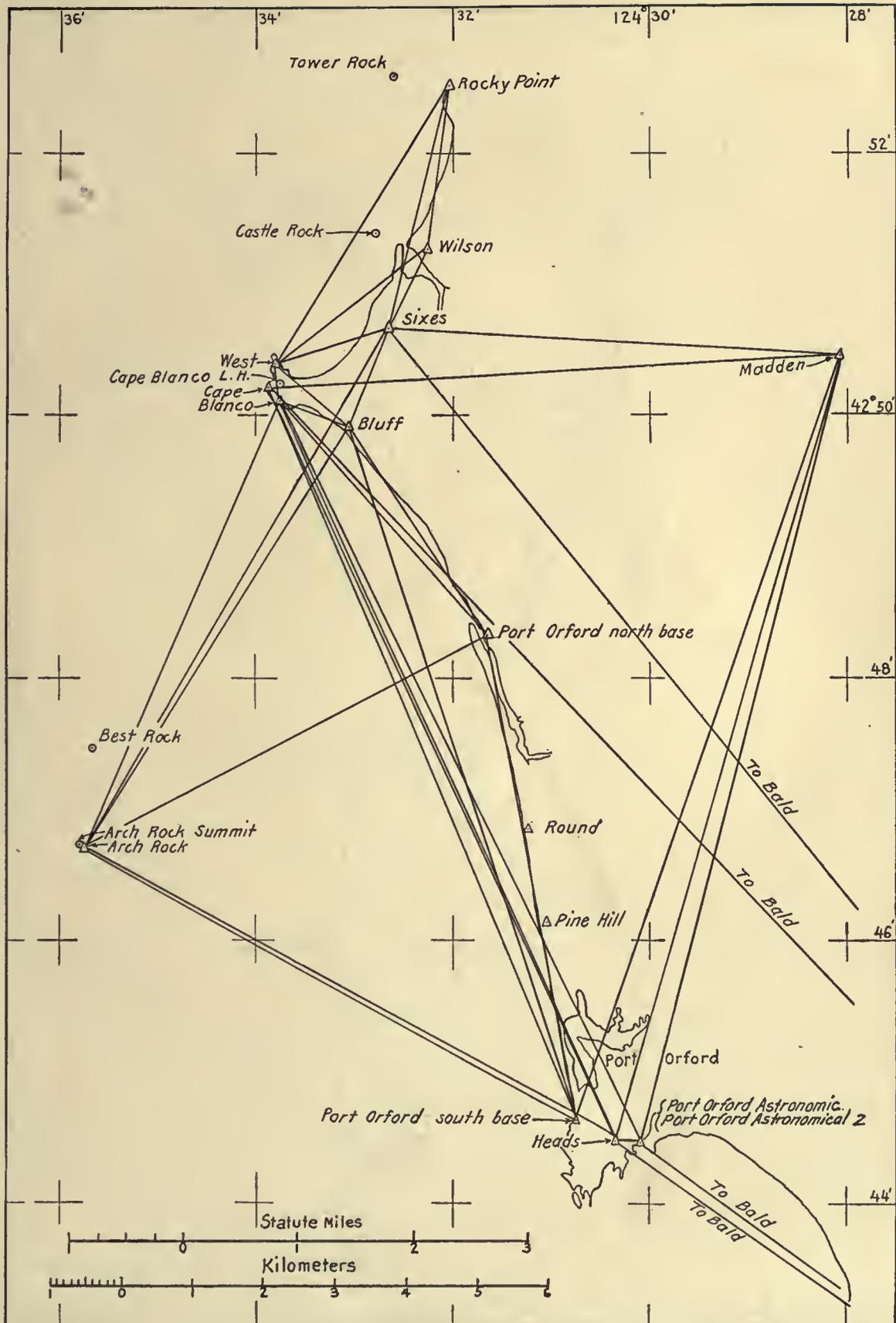


FIG. 40.—TRIANGULATION, CAPE BLANCO TO PORT ORFORD.

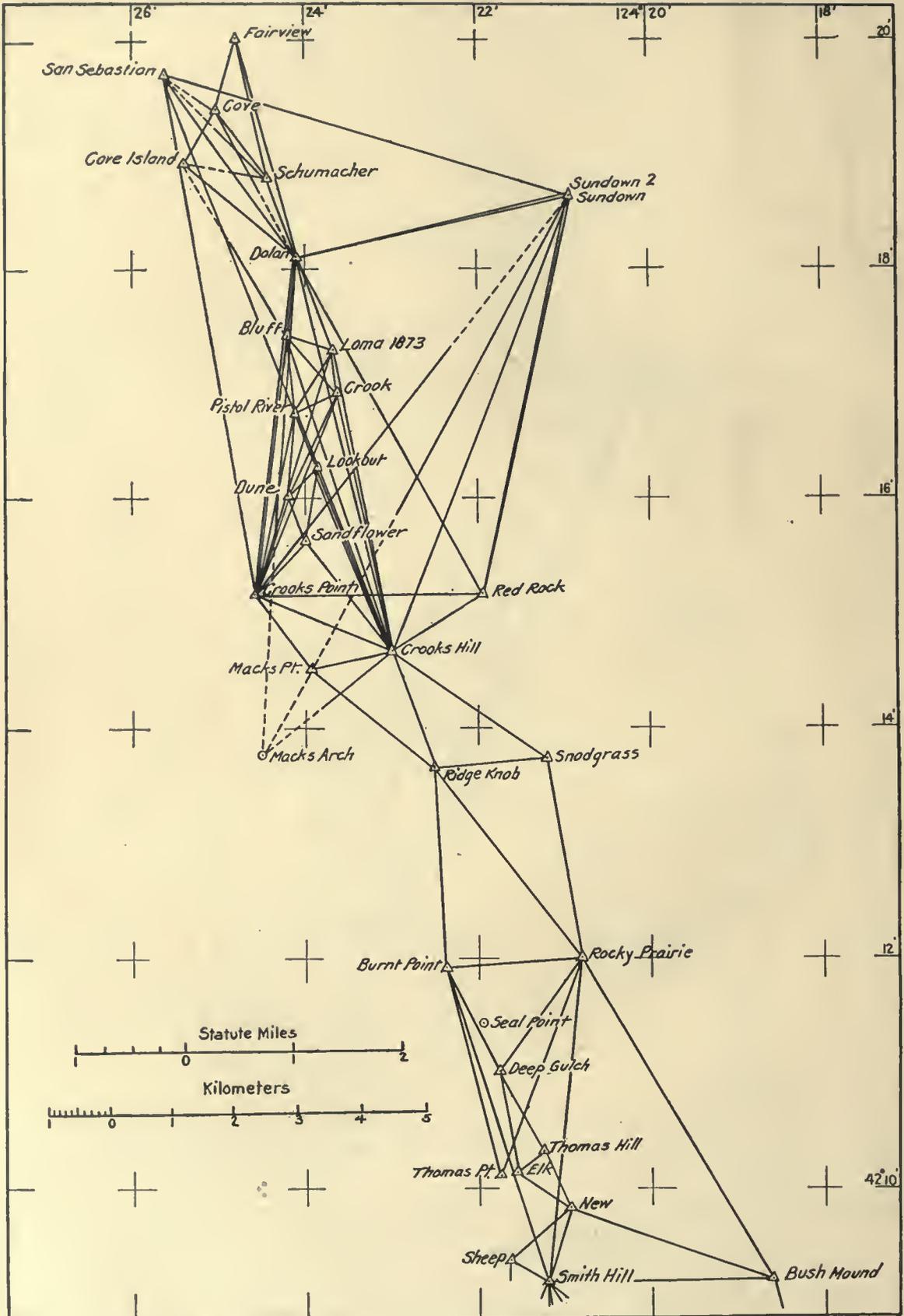


FIG. 41.—TRIANGULATION, SAN SEBASTIAN TO CAPE FERRELO.

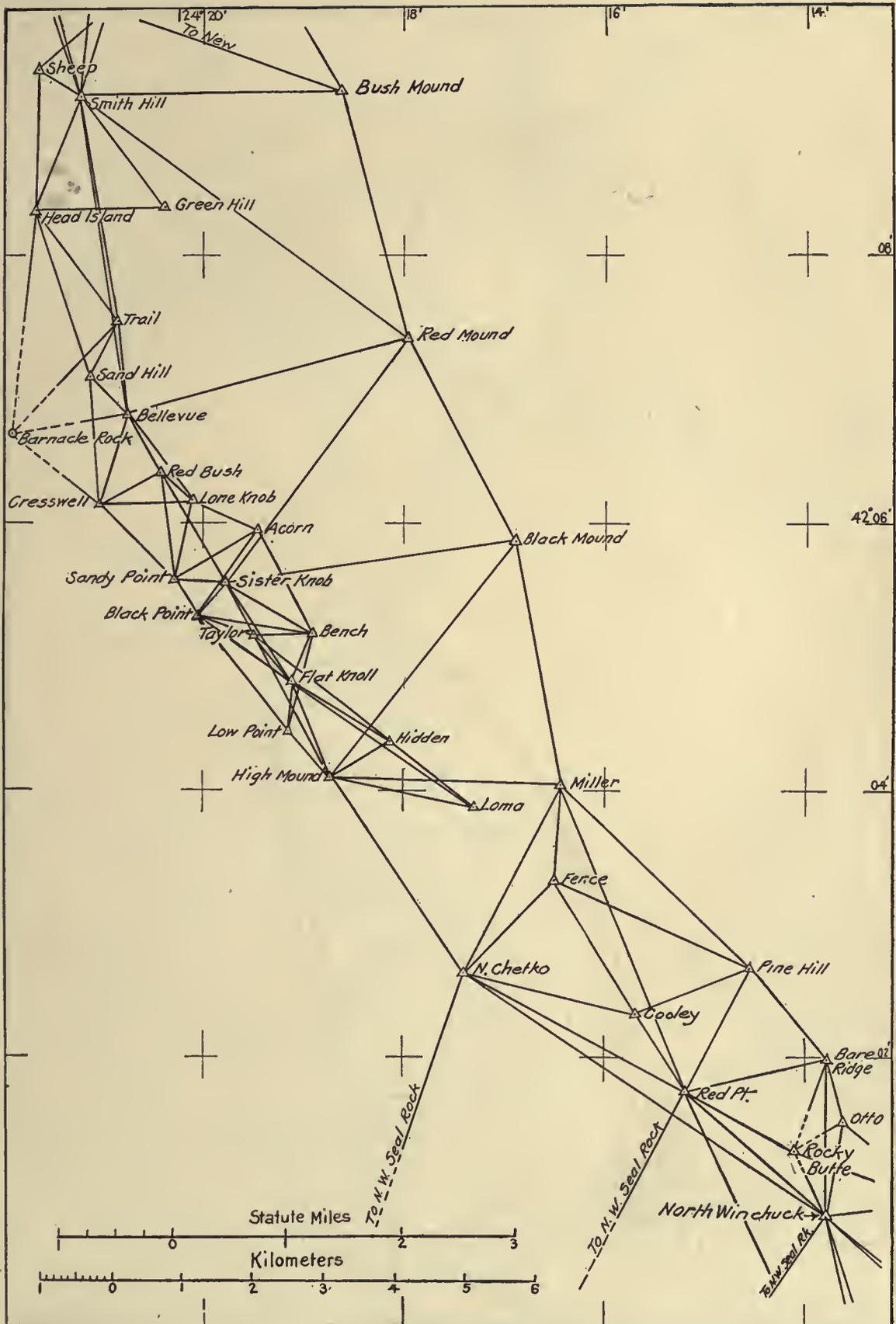


FIG. 42.—TRIANGULATION, CAPE FERRELO TO WINCHUCK RIVER.

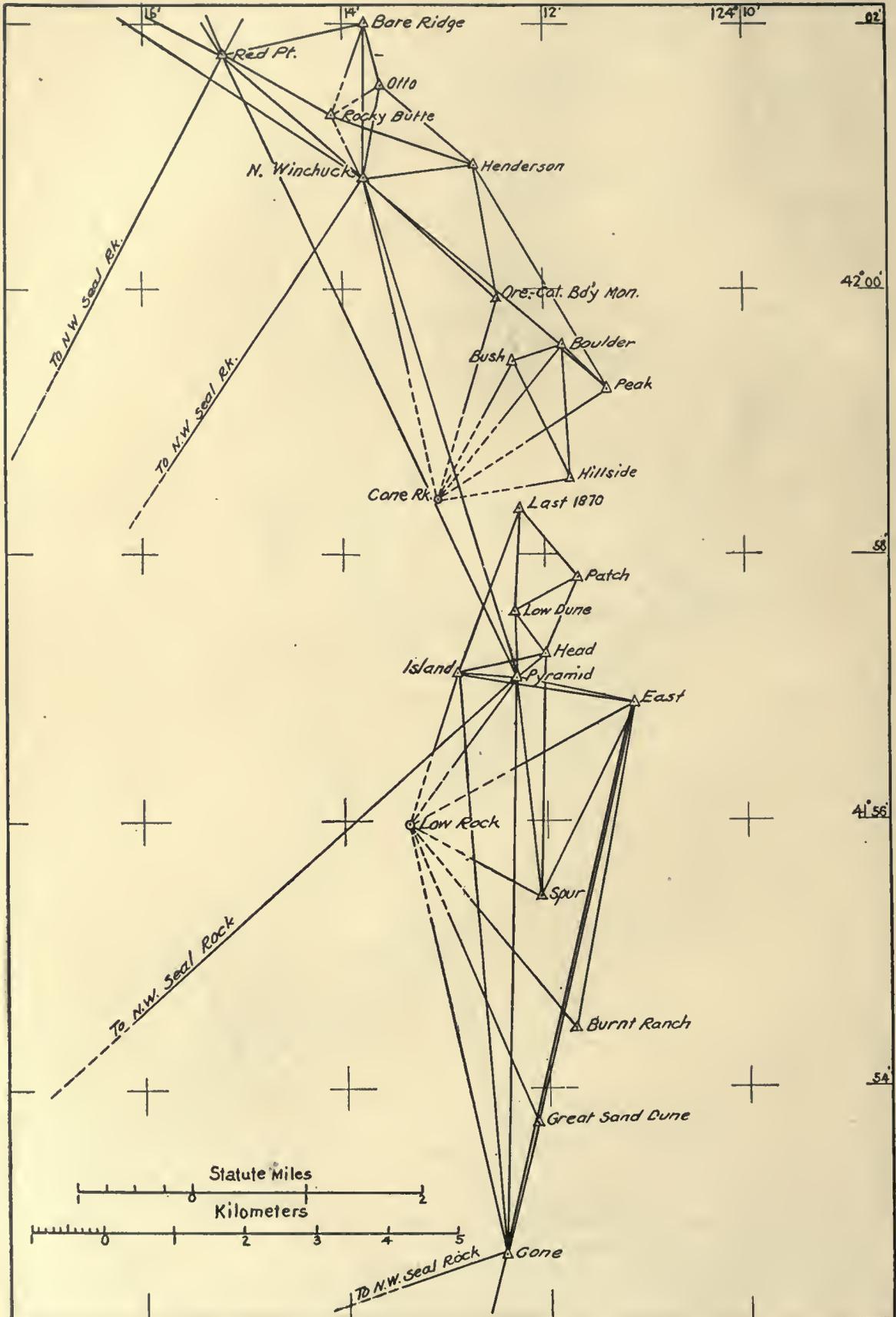


FIG. 43.—TRIANGULATION, WINCHUCK RIVER TO LAKE EARL.

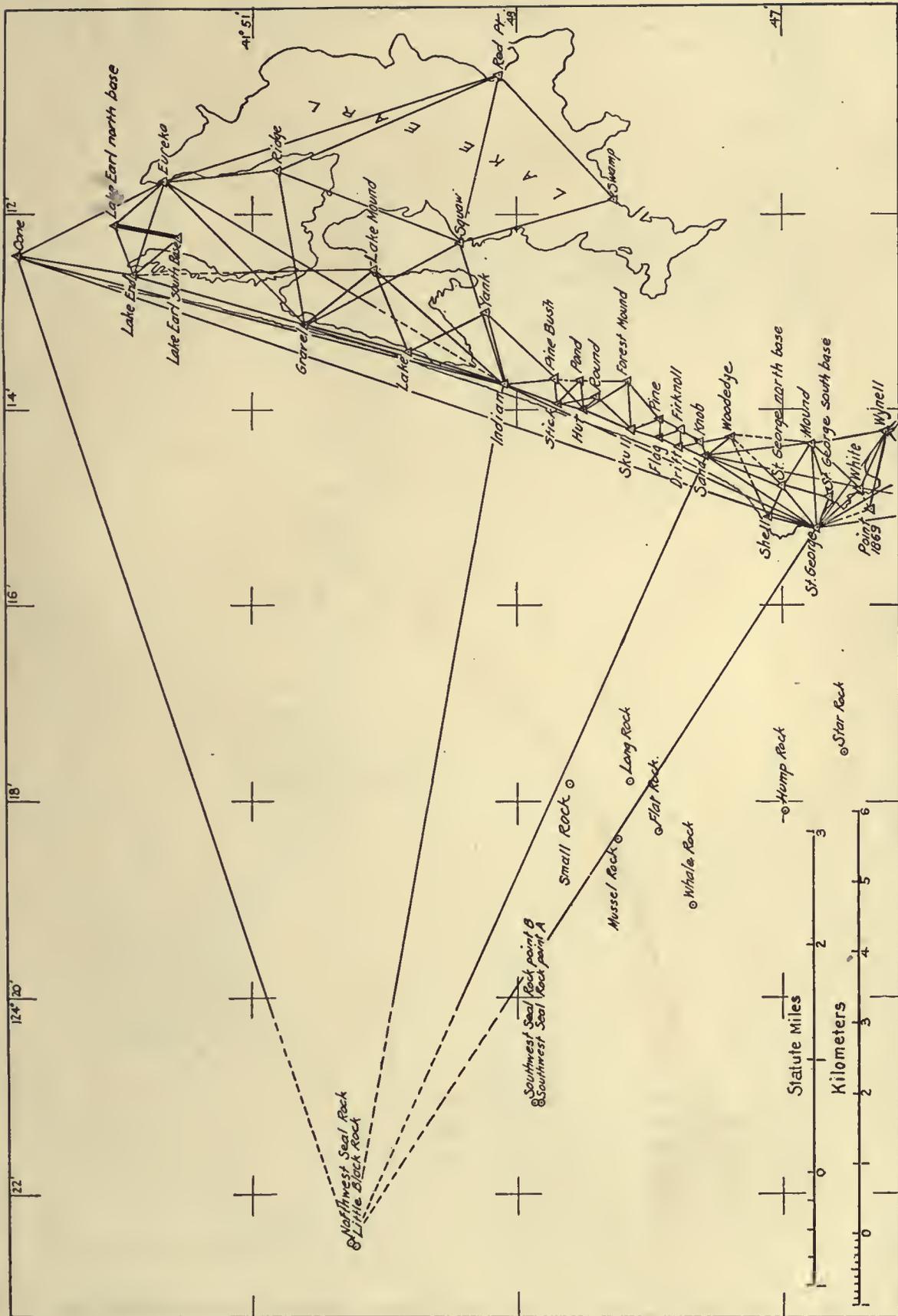


FIG. 44.—TRIANGULATION, LAKE EARL TO POINT ST. GEORGE.

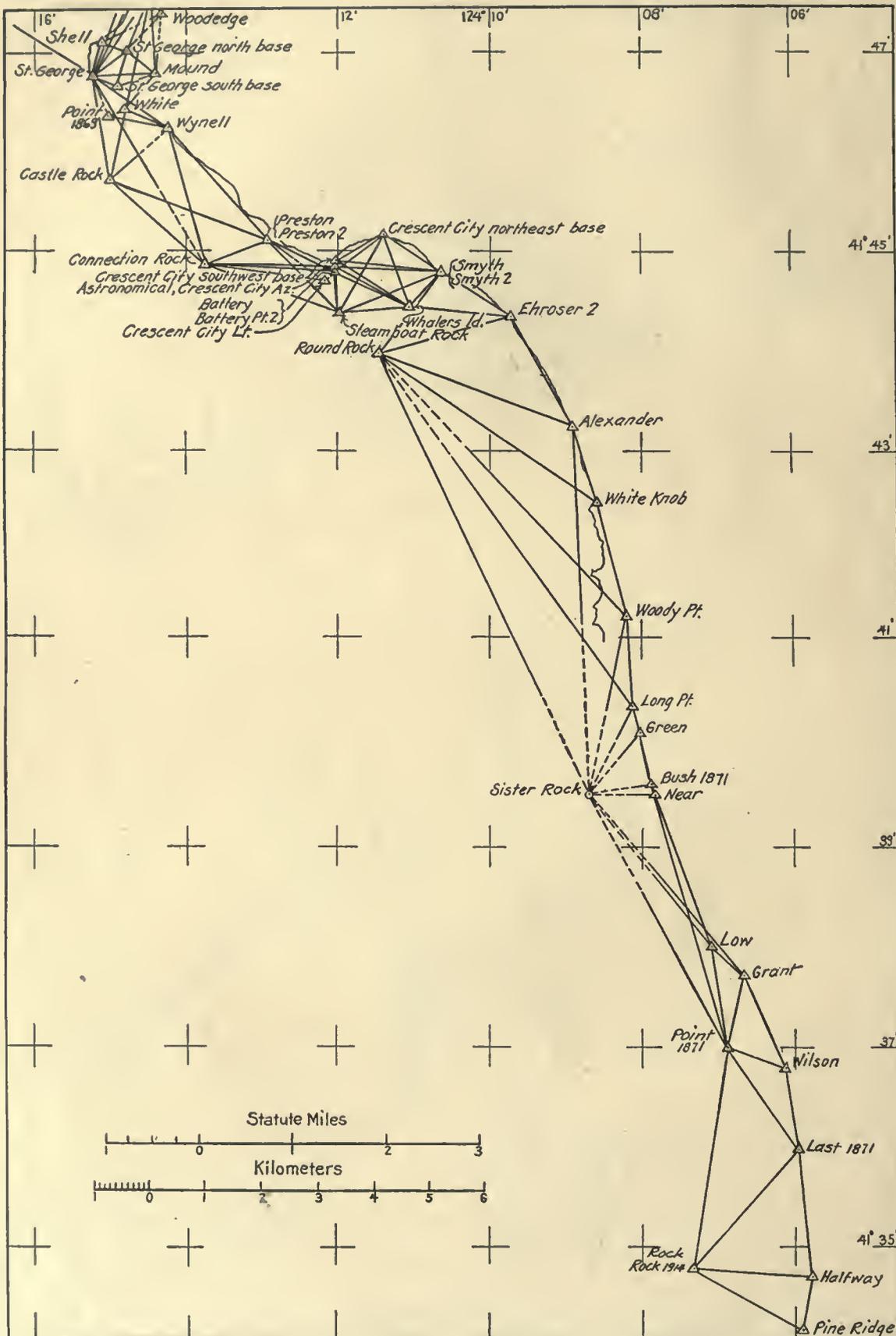


FIG. 45.—TRIANGULATION, POINT ST. GEORGE TO KLAMATH RIVER.

INDEX.

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
	Page	Page	Page	Number		Page	Page	Page	Number
A.....	55			24	Bakers Bay.....	80			
A (U. S. E.).....	25	93		17	Baker west base.....	16	83		12
A (U. S. E.) reference mark.....	25				Balch.....	19	87		20, 21
A 2 (U. S. E.).....	21	88		15	Bald (Curry County).....	50	109	133	37, 38
Abernathy.....	17	84		14	Bald (Lincoln County).....	49	106	132	25, 26
Abrams.....	41	100		17	Bald Hill.....	51	110	133	39
Acorn.....	72	125		42	Balsam.....	40	99		17
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Adams.....	40	99		17	Bank reference mark.....	22			
Ahle Point light.....	38			16	Bare Ridge.....	73	126		42, 43
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Alder (Coos County).....	78				Barlow Point range front light.....	36			14, 15
Alder (Lincoln County).....	59	118		31, 32	Barlow Point range rear light.....	36			14, 15
Alder Bluff.....	36	99		14	Barlow reference mark No. 1.....	20			
Alderbrook (U. S. E.).....	33	98		12, 13	Barlow reference mark No. 2.....	20			
Alderbrook School cupola.....	33			12, 13	Barn (U. S. E.).....	62			32
Alder Butte.....	77	131		39	Barnacle Rock.....	72	125		42
Alder Point.....	57	115		29	Barnes.....	19	86		20
Aldrich (Clatsop County).....	17	83		13	Barn, gable.....	38			16
Aldrich (Skamania County).....	46	104		22	Barnhart.....	57	115		29
Alexander.....	76	130		45	Barn near McGowans, north gable.....	48			22
Allman.....	45	102		19	Barn, north gable.....	80			
Altoona Cannery main building, south gable.....	34			13	Barn, west gable.....	48			22
Anderson.....	17	84		14	Bartlett's barn, north gable.....	47	105		21
Angel.....	46	103		22	Battery (Del Norte County, Cal.).....	76	130		45
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Arch Rock Summit.....	70	123		40	Bay.....	79			
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Astoria:					Beach (Coos County).....	78			
Adair School cupola.....	32			12	Beach, 1885 (Douglas County, Ump- qua River).....	64		132	33
Courthouse dome.....	32			12	Beach, 1908 (Douglas County).....	64	120		33
Finnish Lutheran Church spire.....	33			12	Beach (Tillamook County, Nestugga Bay).....	57	114		29
Marconi northeast wireless.....	33			12	Beach (Tillamook County, Tillamook Bay).....	80			
Marconi southwest wireless.....	33			12	Beach 2 (U. S. E.).....	21	88		15
Range, front light.....	33			12	Beacon.....	80			
Range, rear light.....	33			12	Beacon 8.....	61			30
St. Mary's Hospital cross.....	16			12	Beacon 10.....	61			30
Smith Point iron chimney.....	32			12	Beacon 12.....	61			30
Taylor School cupola.....	32			12	Beacon No. 1.....	34			12, 13
Weather Bureau Tower flag- pole.....	33			12	Beacon No. 2.....	34			13
Astor Point.....	16	83		12	Beacon No. 4.....	34			13
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Bachelors Island.....	80				Beaver.....	78			
Bachelors Point light.....	41			17	Beaver Dock building, north gable.....	37			15
Back.....	61			30	Beaver Lumber Co. tank.....	38			16
Bailey Point.....	56	113		28	Beaver Lumber Co. west stack.....	38			16
Bailey's house, southeast gable.....	56			28	Bellevue.....	72	124		42
Baker east base.....	16	83		12	Bench (Curry County).....	73	125		42
Baker (new).....	19			12	Bench (Douglas County).....	64	119	132	33

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
	Page	Page	Page	Number		Page	Page	Page	Number
Bend (Lincoln County).....	58	116		30	Bush (Del Norte County, Cal.).....	74	126		43
Bend (Tillamook County).....	55	113		24	Bush, 1871 (Del Norte County, Cal.).....	76	130		45
Bend (U. S. E.).....	39	99		16, 17	Bushes Dock, front gable.....	37			15
Bennett.....	50	108	133	37	Bush Mound.....	72	124		41, 42
Best Rock.....	70	123		40	Butler.....	50	109	133	37
Big Barn, east gable.....	47			21	Butlers Landing lee house.....	48			22
Big Barn, south gable.....	47			22	Buzzard Butte.....	50	107	132	25
Bight.....	78				Bybee Landing light.....	39			16
Bight tree.....	77	131		39					
Big Lagoon.....	77	131		39	C (U. S. E.).....	25	93		17
Bill.....	52	111	133	37	C (U. S. E.) reference mark.....	25			
Birnie.....	17	83		14	Cab.....	64	120	132	33
Birnie house, northwest gable.....	35			14	Cable.....	22			16
Black Mound.....	72	124		42	Cable Landing, north side signpost.....	38			16
Black Point.....	72	125		42	Caf.....	59	116		30, 31
Blanco.....	70	123		40	Callender.....	54	112		23
Bluff (Coos County).....	78				Camas.....	50	108	133	37
Bluff (Curry County).....	71	124		41	Camas U. S. G. S.....	52	111		37
Bluff (Curry County, near Cape Blanco).....	70	123		40	Camp Hill.....	66			34
Bluff (Skamania County, Wash.).....	46	104		22	Can.....	59	117		31
Bluff (U. S. E.) (Columbia County).....	21	89		15	Cannery Hill.....	63	119	132	26, 27
Bluff (U. S. E.) (Coos County).....	68	122		35	Cannery, Marshfield.....	69			36
Bluff (U. S. E.) (Cowlitz County, Wash.).....	39	99		16, 17	Cannery smokestack.....	65			33
Bluff (U. S. E.), (Pacific County, Wash.).....	19			12	Cape (Curry County).....	50	108	133	37, 40
Boathouse, east gable.....	60			30	Cape (Lane County).....	49	106	132	26, 27
Bohiver.....	50	108	133	37	Cape Arago lighthouse.....	67			37
Bonneville.....	46	104		22	Cape Blanco lighthouse.....	70			40
Boom.....	53	111		23	Cape Disappointment.....	16	83		12
Boone.....	59	117		31	Cape Disappointment astronomic.....	31			12
Bosley.....	51	109	133	38	Cape Disappointment lighthouse.....	16			12
Boulder.....	73	126		43	Cape Falcon Rock.....	54			24
Boulder Point.....	50	107	132	21, 25, 28	Cape Horn.....	17	84		14
Bourne (U. S. E.).....	21	88		15	Cape Horn Tree.....	48			22
Bourne's house, west gable.....	37			15	Cape Lookout summit.....	52		132	25
Bouser.....	18	86		20	Cape Mears lighthouse.....	55			28
Bozley.....	56	114	132	25, 29	Cape Ridge.....	63			26, 27
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Bridge, Yaquina Bay.....	60			30	Carr reference mark.....	18			
Brookfield cannery.....	35			13	Carruthers.....	40	99		17
Brookside.....	41	100		20	Carson tree.....	64			33
Brush (Multnomah County).....	45	103		21	Cascade (Hood River County).....	46	104		22
Brush (Tillamook County).....	56	113		28	Cascade (Tillamook County).....	49	107	132	25
Brush 2 (U. S. E.).....	26			18	Cascade Locks Church.....	49			22
Brushy Hill.....	64			33	Cascade Locks flagstaff.....	49			22
Brushy Hill 2.....	64	119	132	27, 33	Case.....	58	116		30
Brushy Ridge.....	65			34	Castle.....	77	131		39
Buckhorn.....	57	115		29	Castle Rock (Curry County).....	70			40
Bugby Hole Eccentric.....	36	98		14	Castle Rock (Del Norte County).....	75	129		45
Bugby Hole Eccentric reference mark.....	36				Castle Rock (Multnomah County).....	48			22
Bugby Hole light.....	36			14	Catheart.....	50	108	133	37
Buoy Depot, flag.....	33			12	Cathlamet light.....	36			14
Burn.....	49	106	132	27, 33	Cathlamet Point.....	17	83		13
Burnt Hill.....	18	85		17	Catholic Church cross, Kalama.....	38		133	16
Burnt Point.....	72	124		41	Cem.....	19			20
Burnt Ranch.....	74	127		43	Cement stack.....	43			19
Burroughs.....	36	98		14	Cemetery.....	67	121		35
					Chamberlain's barn.....	47			21
					Channel.....	80			
					Charleston.....	78			
					Charleston 2.....	68	122		35

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
	Page	Page	Page	Number		Page	Page	Page	Number
Child.....	51	110	133	39	Cotton (Cowlitz County, Wash.).....	22	90		15, 16
Chimney, house.....	36			13, 14	Cotton reference mark No. 1 (Cowlitz County).....	22			
Chimney, house, south end of Tenasil- likee Island.....	36			14	Cotton reference mark No. 2 (Cowlitz County).....	22			
Chimney, near white house.....	38			16	Cottonwood Island.....	36	99		15
Chimney, white house.....	39			16	Cottonwood Island, 1913.....	22	90		15, 16
Chinook (U. S. E.).....	19			12	Cottonwood Island lower range rear light.....	37			15, 16
Chinook Church spire.....	32			12	Cottonwood Island lower and upper ranges front light.....	37			15
Church, flagstaff.....	61			30	Cottonwood Island, 1913, reference mark No. 1.....	22			
Church, Goble.....	38			16	Cottonwood Island, 1913, reference mark No. 2.....	22			
Church, Kalama, star.....	38			16	Cottonwood Island upper range rear light.....	37			15, 16
Church, St. Helens.....	40			17	Council Mound.....	77	130		39
Church spire, Chinook.....	32			12	Council Point.....	77	130		39
Church steeple, Rainier.....	37			15	Courthouse dome, Astoria.....	32			12
City.....	60	118		32	Courthouse dome, Portland.....	42			19
Clark's house, chimney.....	56			28	Courthouse flagstaff, Toledo.....	63			32
Clatskanie.....	17	84		14	Cove.....	71	124		41
Clay.....	59	117		31	Cove Island.....	71	124		41
Cliff (Clatsop County).....	54	112		23	Coweman.....	17	84		15
Cliff (Douglas County).....	65			33	Cowlitz.....	36	99		15
Cliff (Multnomah County).....	45	103		21, 22	Cowlitz 2 (U. S. E.).....	21	89		15
Cliff Point.....	80				Cowlitz River light.....	37			15
Climb.....	46	104		22	Crag.....	50	107		24
Cloniger.....	41	100		20	Craggy.....	51	109	133	38
Coal Bank.....	78				Craven.....	57	114		29
Coal Bank tree.....	79				Crawford.....	78			
Coal Creek Ridge.....	17	84		14	Crawford 2.....	68	121		36
Coffin Rock (U. S. E.).....	21	89		16	Crawford Point (U. S. E.).....	69	122		36
Coffin Rock light.....	38			16	Crescent City azimuth.....	76	129		45
Colliers Butte.....	52		133	38	Crescent City lighthouse.....	76			39, 45
Columbia City range front light.....	39			17	Crescent City northeast base.....	76	130		45
Columbia City range rear light.....	39			17	Crescent City southwest base.....	76	130		45
Columbia Flour Mill, water tank.....	44			20	Cresswell.....	72	125		42
Columbia River Door Co. Dock, water tank.....	37			15	Crest.....	44	101		20
Columbia River entrance range front light.....	32			12	Crib No. 1.....	37			15
Columbia River entrance range rear light.....	32			12	Crib No. 4.....	37			15
Condit.....	54	112		23	Crib No. 8.....	37			15
Cone.....	74	127		43, 44	Crib No. 11.....	37			15
Cone Rock.....	73	126		43	Crook.....	71	124		41
Congregational Church, St. Helens.....	40			17	Crooks Hill.....	71	124		41
Congregational Church spire, Port- land.....	42			19	Crooks Point.....	71	123		41
Connection Rock.....	75	129		45	Cross, priest's house.....	80			
Connel 2 (U. S. E.).....	23	91		16, 17	Cummins.....	49	106	132	26, 27
Connel 2 (U. S. E.) reference mark.....	23				Cupola, Seaside house.....	54	112		23
Cooley.....	73	126		42	Cupola, Vancouver.....	80			
Coon Island light.....	43			18	Curve (U. S. E.), (Columbia County).....	20	88		15
Cooper (Coos County).....	78				Curve (U. S. E.), (Coos County).....	68	122		35
Cooper (Wahkiakum County, Wash.).....	17	84		14	Customhouse dome, Portland.....	41			19
Coos.....	68	122		36	Cut (Columbia County).....	22	90		15, 16
Coos Bay north base.....	67	121		35	Cut (Lincoln County).....	50	117		31
Coos Bay south base.....	67	121		35	Cut reference mark (Columbia County).....	22			
Coos Bay tree.....	65			34, 35	D (U. S. E.).....	25	92		17
Coos Head.....	78				D (U. S. E.) reference mark.....	25			
Coos Head 2.....	67	121		35	D 1 (U. S. E.).....	21	89		16
Coos Head 3.....	67	121		35	D 2 (U. S. E.).....	21	89		16
Coos River Hill.....	68	122		36	D 3 (U. S. E.).....	21	89		16
Coquille Point light.....	61			30	D 4 (U. S. E.).....	21	89		16
Coquille River lighthouse.....	52			37	D 5 (U. S. E.).....	21	89		15, 16
Corbett.....	47	105		21					
Corral.....	64			33					
Cotton (Coos County).....	52	111	133	37					

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
	Page	Page	Page	Number		Page	Page	Page	Number
D 6 (U. S. E.)	21	89		15,16	East	74	127		43
D 7 (U. S. E.)	21	89		15,16	East Battery	16	82		12
D 8 (U. S. E.)	21	89		15,16	East Battery reference mark No. 1	16			
D 9 (U. S. E.)	21	89		15,16	East Battery reference mark No. 2	16			
D 10 (U. S. E.)	21	89		15	East Battery reference mark No. 3	16			
Danels	45	102		21	East Silo	42			18
Dann	80				Edson	52	111	133	37
Dann's house, north gable	80				Ehroser 2	76	129		45
Dark	60	118		32	Eight (U. S. E.), (Clarke County)	24	92		17
Dark pile, day mark	39			16,17	Eight (U.S.E.), (Multnomah County)	30	97		18
Dash	79				Eighteen (U. S. E.)	30	97		18,19
Day beacon	62			32	Eleven (U. S. E.), (Columbia County)	24	92		17
Day mark	43			18,19	Eleven (U. S. E.), (Multnomah County)	30	97		18,19
Day mark on dolphin	39			17	Eleven (U. S. E.) reference mark (Columbia County)	24			
Day mark on tree, Bybee Landing	39			16	Elk	72	125		41
Dead	59	118		31,32	Elk 1913	51	110	133	38,39
Dead tree	80				Elliott (U. S. E.)	33	97		13
Dead tree back of bluff	48			22	Elliott Point light	35			13
Dead tree near Cabin Falls	48			22	Empire	79			
Dead Willow (U. S. E.)	25	93		17	Empire 2	67	121		35
Dead Willow (U.S.E.) reference mark	25				Empire 3	67	121		35
Deaf and Dumb School	47			21	Empire Dock (U. S. E.)	68	122		35
Dean	49	106	132	27	Empire Mill	79			
Deep Gulch	72	125		41	End (Hood River County)	46	104		22
Deer	64			33,34	End (Multnomah County)	27	95		18
Deer Island	80				End reference mark (Multnomah County)	27			
Deer Island Jetty light	39			17	Enterprise Landing range front light	38			16
Dennis	78				Enterprise Landing range rear light	37			16
Depot Slough light	62			32	Episcopal Church cross, Kalama	36			16
Desdemona Sands lighthouse	16			12	Episcopal Church spire, Portland	41			19
Dewey	66	120		36	Episcopal Church, Vancouver	46			21
Dexter	54	112		23	Et.	58	116		30,31
Diercks	64			33	Euchre Mountain	51		132	25,26
Dike (Lincoln County)	60	118		32	Eureka	74	127		44
Dike (U. S. E.)	28	96		19	Eversole	80			
Dike (Wahkiakum County)	20	88		14	F	55			24
Dike reference mark (Wahkiakum County)	20				F (U. S. E.)	29	96		19
Dillon's house, north gable	80				Fairmont Gas Co.'s stack	43			19
Dock	22	90		16	Fairview (Curry County)	71	124		41
Dock (U. S. E.), (Columbia County, Columbia City)	23	91		17	Fairview (Lane County)	49	106	132	26,27
Dock (U. S. E.), (Columbia County, Rainier)	21	89		15	Fairview cupola	47			21
Dodson	46	104		22	Falcon	55	112		24
Doe	65			34	Fales	18	86		17,20
Dolan	71	123	133	38,41	Fales (U. S. E.)	25	93		17
Dot (U. S. E.)	33	98		12	Fales House, red chimney	41	100		17,20
Doty	55	113	132	24,25,28	Fales Landing light	42			17
Double Rock, eastern peak	54			24	Fales (U. S. E.) reference mark	25			
Drays Mound	18	85		16	Fall	69			35
Drift (Del Norte County, Cal.)	75	128		44	Far	61			30
Drift (Tillamook County)	58	115		29	Faulconer	57	115		25
Dry	60			30	Faun 2	66			34
Duke	79				Federal east wireless	44	101		20
Dunee	54	112		23	Federal west wireless	44	101		20
Dune (Curry County)	71	124		41	Fence	73	126		42
Dune (Douglas County)	64			33	Fern Hill	57	114		29
Dune (Lincoln County)	60	118		32	Feld	60	118		32
E	55			24	Fifteen (U. S. E.)	30	97		18,19
E (U. S. E.)	25	93		17	Fifty 2 (U. S. E.)	29	96		19
E (U. S. E.) reference mark	25				Fifty-eight 2 (U. S. E.)	29	96		19
Eagle Cliff	36	99		14	Fifty-five 2 (U. S. E.)	29	96		19
Eagles Bluff	45	103		21	Fifty-four 2 (U. S. E.)	29	96		19

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
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Fifty-nine 2 (U. S. E.).....	30	96		19	Foulweather.....	49	106	132	25, 26
Fifty-one 2 (U. S. E.).....	29	96		19	Four (U. S. E.).....	31	97		18
Fifty-seven 2 (U. S. E.).....	29	96		19	Four 2 (U. S. E.), (Clarke County)...	41	100		17
Fifty-six 2 (U. S. E.).....	29	96		19	Four 2 (U. S. E.), (Multnomah County).....	27	94		18
Fifty-three 2 (U. S. E.).....	29	96		19	Four 2 (U. S. E.), reference mark (Multnomah County).....	27			
Fifty-two 2 (U. S. E.).....	29	96		19	Four Brothers No. 1.....	53	111	133	39
Finnish Lutheran Church spire, Astoria.....	33			12	Four Brothers No. 2.....	53	111	133	39
Fir.....	19		133	20	Four Brothers No. 3.....	53	111	133	39
Fire Hall flagstaff, St. Johns.....	44			19	Four Brothers No. 4.....	53	111	133	39
Firknoll.....	75	128		44	Fourteen (U. S. E.).....	30	97		18, 19
Fisher.....	45	102		21	Fridlund.....	79			
Fisher Wharf, southeast pile.....	47	105		21	Front range 1.....	61			31
Fishery.....	53	111		24	Front range 2.....	61			31
Fish house, leaning stack.....	34			13	Front range 3.....	62			32
Fish house, stack.....	35			13	Front range 4.....	62			32
Fish house, west barrel.....	34			13	Front range 5.....	62			32
Fish wheel on north shore.....	49			22	Front range 6.....	62			32
Five (U. S. E.).....	31	97		18	Front range 7.....	62			32
Five 2 (U. S. E.).....	25	92		17	Front range 8.....	62			32
Five 2 (U. S. E.) reference mark No. 1.....	25				Front range 9.....	62			32
Five 2 (U. S. E.) reference mark No. 2.....	25				Front range 10.....	63			32
Flag.....	75	128		44	Front range 11.....	63			32
Flagpole.....	37			15	Full.....	61			30
Flagstaff (Clatsop County).....	54	112		23	Gage.....	57	114		29
Flagstaff (Tillamook County).....	54			24	Gage B.....	56	114	132	25, 29
Flat (Columbia County).....	22	90		16	Galloway.....	18	85		15, 16
Flat (Lincoln County).....	60	118		32	Gap.....	56	113		28
Flat (Tillamook County, Tillamook Bay).....	56	113		28	Garden.....	79			
Flat (Tillamook County, Nestugga Bay).....	56	114	132	25	Gardiner.....	65			33
Flat Knoll.....	73	125		42	Gatton.....	28	95		19, 20
Flat reference mark No. 1 (Columbia County).....	22				Gatton House chimney.....	41			20
Flat reference mark No. 2 (Columbia County).....	23				Gatton reference mark No. 1.....	28			
Flat Rock.....	78			44	Gatton reference mark No. 2.....	28			
Flavels Wharf post light.....	32			12	Gauge pile.....	33			12, 13
Fletcher.....	56	114	132	25, 29	Gearhart.....	54	112		23
Flint Ridge.....	51	110		39	G. Hume's house, chimney.....	36			14
Flint Rock.....	77	130		39	Gibbons Creek.....	47	105		21
Flint Rock 2.....	51	110		39	Gibbons Creek Church.....	47			21
Foley.....	50	107		24	Gillihan tank, white.....	43			18, 19
Forest Mound.....	75	128		44	Ginger.....	50	107	132	24, 25
Fort Columbia Wharf light.....	31			12	Gobles Point.....	18	85		16
Fort Stevens highest water tank.....	32			12	Goodwin.....	53	111		23
Fort Stevens longitude.....	16	82		12	Goose.....	57	114		29
Fort Stevens Wharf light.....	16			12	Gordon.....	51	110	133	39
Fort Stevens wireless, north pole.....	32			12	Gorman's barn.....	48			22
Forty (U. S. E.).....	28	96		19	Gorman's house.....	48			22
Forty-eight 2 (U. S. E.).....	29	96		19	Government Island.....	45	103		21
Forty-five (U. S. E.).....	29	96		19	Grant.....	76	130		45
Forty-five 2 (U. S. E.).....	29	96		19	Grass (Coos County).....	68	122		36
Forty-four (U. S. E.).....	29	96		19	Grass (Lincoln County).....	60	118		32
Forty-four (U. S. E.) reference mark.....	29				Grass (Tillamook County).....	57	114		29
Forty-nine 2 (U. S. E.).....	29	96		19	Grass Mound (U. S. E.).....	68	122		35
Forty-one (U. S. E.).....	29	96		19	Grass Mountain.....	52			26
Forty (U. S. E.) reference mark.....	28				Grassy (U. S. E.).....	25	93		17
Forty-seven (U. S. E.).....	29	96		19	Grassy (U. S. E.) reference mark.....	25			
Forty-six 2 (U. S. E.).....	29	96		19	Gravel (Del Norte County).....	74	127		44
Forty-three (U. S. E.).....	29	96		19	Gravel (Lincoln County).....	59	117		31
Forty-two (U. S. E.).....	29	96		19	Gravel Bluff.....	28	95		20
Fossil.....	79				Grays (U. S. E.).....	20	87		12, 13
Fossil 2.....	67	121		35	Grays Bay.....	34	98		12, 13
					Grays Bay light.....	34			12, 13
					Grays Point.....	17	83		12, 13

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Grays Point lighthouse.....	32			12, 13	Hardy Rock.....	58	115		29
Grays River.....	34	98		13	Hardys wharf.....	79			
Great Sand Dune.....	74	127		43	Harlow.....	45	102		21
Green (Del Norte County, Cal.).....	76	130		45	Harney.....	19	86		20, 21
Green (Lane County).....	63	119	132	26, 27	Harrington (U. S. E.).....	19	87		13
Green Bluff.....	57	114		29	Harrington Point range rear light.....	34			13
Green Hill (Curry County).....	72	125		42	Harrington (U. S. E.) reference mark.....	19			
Green Hill (Tillamook County).....	56	113		28	Harris.....	41	100		20
Green Hill 2.....	55	113	132	24, 28	Hay Barn.....	79			
Greens Point.....	17	84		14	Hay Barn (U. S. E.).....	69	122		36
Gregory.....	79				Hayden.....	45	102		19
Grimes.....	54	112		23	Haynes.....	68	122		34
Grizzly.....	51	109	133	38	Haystack Rock.....	57			
Grout.....	45	103		21, 22	Hazel.....	28	95		20
Grove.....	67	121		35	Head (Del Norte County, Cal.).....	74	127		43
Gruber.....	36	98		14	Head (Lane County).....	63	119	132	26, 27
Gun (U. S. E.).....	33	97		12	Head Island.....	72	125		42
H (U. S. E.).....	19			12	Heads.....	50	109	133	37, 38, 40
H 1 ₂ (U. S. E.).....	24	92		17	Hebe.....	50	107	132	25
H 1 ₂ (U. S. E.) reference mark.....	24				Heceta.....	63	119	132	26, 27
H 3 (U. S. E.).....	24	92		17	Heceta Head lighthouse.....	63		132	26, 27
H 3 (U. S. E.) reference mark.....	24				Henderson (Coos County).....	67	121		35
H 4 (U. S. E.).....	24	92		17	Henderson (Curry County).....	73	126		43
H 4 (U. S. E.) reference mark.....	24				Henderson (U. S. E.).....	69	122		35
H 5 ₂ (U. S. E.).....	24	91		17	Hendrickson.....	41	101		20
H 5 ₂ (U. S. E.) reference mark.....	24				Henricl.....	80			
H 6 ₂ (U. S. E.).....	24	92		17	Henricl Landing range front light.....	40			17
H 6 ₂ (U. S. E.) reference mark.....	24				Henricl Landing range rear light.....	40			17
H 7 ₂ (U. S. E.).....	24	91		17	Hewletts 2 (U. S. E.).....	26	94		18
H 7 ₂ (U. S. E.) reference mark.....	24				Hexter.....	45	102		21
H 8 ₂ (U. S. E.).....	24	91		17	Hidden.....	73	125		42
H 8 ₂ (U. S. E.) reference mark.....	24				Hilgh.....	60	118		32
H 9 ₂ (U. S. E.).....	23	91		17	High Bald Peak.....	63			26
H 9 ₂ (U. S. E.) reference mark.....	23				High Bluff.....	51	110		39
H 11 (U. S. E.).....	23	91		17	High Divide.....	51	110	133	39
H 11 (U. S. E.) reference mark.....	23				High Mound.....	72	124		42
H 13 ₂ (U. S. E.).....	23	91		17	High School, St. Johns.....	44			19
H 13 ₂ (U. S. E.) reference mark.....	23				High tank, remains of windmill.....	42			18
H 14 ₂ (U. S. E.).....	23	91		17	Hill (Lincoln County).....	59	117		31
H 14 ₂ (U. S. E.) reference mark.....	23				Hill (Multnomah County).....	19		133	20
H 16 ₂ (U. S. E.).....	23	91		17	Hill (U. S. E.), (Cowlitz County).....	23	91		16
H 19 (U. S. E.).....	23	91		16	Hill (U. S. E.), (Lincoln County).....	61			31
H 19 (U. S. E.) reference mark.....	23				Hill a.....	55			24
H 20 (U. S. E.).....	23	91		16, 17	Hill b.....	55			24
H 20 (U. S. E.) reference mark.....	23				Hill c.....	55			24
H 21 (U. S. E.).....	23	90		16	Hill, first east of Yaquina lighthouse.....	51			26
H 21 (U. S. E.) reference mark.....	23				Hill (U. S. E.) reference mark (Cowlitz County).....	23			
H 22 (U. S. E.).....	23	91		16	Hillside (Del Norte County, Cal.).....	74	127		43
H 22 (U. S. E.) reference mark.....	23				Hillside (Multnomah County).....	41	101		20
H 23 ₂ (U. S. E.).....	23	91		16	Hint.....	58	116		30
H 23 ₂ (U. S. E.) reference mark.....	23				Hoffman.....	18	85		16
H 24 (U. S. E.).....	39	99		16	Hoffman Landing light.....	39			16
H 26 ₂ (U. S. E.).....	22	90		16	Hoffman Hill.....	28	96		20
H 27 (U. S. E.).....	21	89		16	Hog.....	62			32
H 28 (U. S. E.).....	21	90		16	Holland.....	36	99		14
H 30 ₂ (U. S. E.).....	21	89		16	Homestead.....	42	101		20
H. & R. Duck Club, white house, front chimney.....	39			17	Hood.....	45	102		21
Hagglund.....	79				Horseshoe Dune.....	57	115		29
Halfway.....	77	130		45	House, chimney.....	47			21
Hamilton fish wheel.....	48			22	House in trees, cupola.....	48			22
Hammock.....	66			34	House, large green cupola.....	61			30
Hanson (U. S. E.).....	62			32	House No. 1, south gable.....	80			
Hapgood House chimney.....	36			14	House No. 2, north gable.....	56			28
					House No. 3, south gable.....	56			28

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House No. 4, east gable.....	80				Kalama (U. S. E.).....	21	89		16
House No. 5, north gable.....	80				Kalama astronomic.....	80			
House No. 6.....	56			24, 25	Kalama Azimuth.....	80			
House, west gable.....	41			20	Kalama Catholic Church cross.....	38			16
Howell.....	27	95		18, 19, 20	Kalama Church star.....	38			16
Howell house, east chimney.....	41	101		20	Kalama reference mark.....	22			
Howell reference mark No. 1.....	27				Keaton.....	53	111		24
Howell reference mark No. 2.....	27				Keeper's house, chimney.....	63			26, 27
Hulet.....	78				Kelso School.....	37			15
Hump.....	60	118		32	Kelso square tower.....	37			15
Hump Rock.....	78			44	Kelso white church, red spire.....	37			15
Hunter.....	18	85		16	Kenny.....	79			
Hunting Island range rear light.....	35			14	Kilstrom.....	65			34
Huntington.....	17	84		15	King.....	28	96		20
Hunts Mill Point.....	17	83		14	King (Lincoln County).....	59	117		31
Hut.....	75	128		44	Kitchen.....	78			
Hut (U. S. E.).....	21	88		15	Klamath South.....	77	130		39
Hutchinson.....	66	120		34, 35	Klamath South 2.....	51	110	133	39
Hutchinson 2.....	67	121		35	Klevenhausen store, flagpole.....	34			13
					Knapp.....	41	100		20
I (U. S. E.).....	19			12	Knapp's chimney.....	41			20
Incinerator stack.....	43			19	Knappton Channel light.....	32			12
Indian.....	74	127		44	Knappton sawmill cupola, flagstaff.....	32			12
Indian 2.....	66			34	Knight.....	22	90		16
Indian Point.....	17	83		13	Knight reference mark No. 1.....	22			
Inner Turtle Rock.....	77	131		29	Knight reference mark No. 2.....	22			
Iron.....	49	106	132	36	Knob.....	75	128		44
Island (Coos County).....	78								
Island (Del Norte County).....	74	127		43	Ladd.....	40	100		17
Island (U. S. E.), (Coos County).....	69	122		35	La Du light.....	37			15
Island (U. S. E.), (Pacific County).....	16	82		12	Ladys Island.....	45	103		21
Island (U. S. E.) reference mark (Pacific County).....	16				Lagoon.....	65			34, 35, 36
Island Rock.....	52			37, 38	Lake (Clatsop County).....	53	112		23
Islet 1.....	54	112		23	Lake (Del Norte County, Cal.).....	74	128		44
Islet 2.....	54	112		23	Lake (U. S. E.).....	24	92		17
Isthmus.....	78				Lake Earl north base.....	74	127		44
Isthmus 2.....	68	122		36	Lake Earl south base.....	74	127		44
Isthmus tree.....	79				Lake End.....	74	127		44
					Lako Mound.....	74	128		44
Jarvis.....	65			34	Lake (U. S. E.) reference mark.....	24			
Jarvis (U. S. E.).....	69	122		35	Lake River.....	40	100		17
Jet.....	58	115		30	Lake View.....	64			33
Jetty.....	67	121		35	Lancaster.....	80			
Jetty A.....	31	97		12	Landing.....	53	111		24
Jetty B.....	31	97		12	Large red tank with pole.....	44			19
Jetty C.....	31	97		12	Large Rock off Carleton.....	55			24
Jetty D.....	31	97		12	Large tree, top out.....	38			16, 17
Jetty E.....	31	97		12	Large white house, chimney.....	42			17
Jetty F.....	31	97		12	Last (Lincoln County).....	60	118		32
Jetty Sands range front light.....	31			12	Last, 1870 (Del Norte County, Cal.).....	74	127		43
Jetty Sands range rear light.....	31			12	Last, 1871 (Del Norte County, Cal.).....	76	130		45
Jewetts (U. S. E.).....	26	94		18	Late.....	65			34
Jim Crow (U. S. E.).....	20	88		13	Launch.....	60	118		32
Jim Crow Point.....	17	83		13	Ledge.....	54	112		23
Jim Crow Point light.....	35			13	Leeds.....	65			33
John Day Point.....	34	98		12, 13	Lemont.....	40	99		17
Johnson (Coos County).....	50	108	133	37	Lever's house, east gable.....	47			21
Johnson (Coos County, Coos Bay).....	79				Lewis and Clarke River.....	80			
Johnson (Humboldt County, Cal.).....	77	131		39	Lewis River Hills.....	18	85		17
Journal spire, Portland.....	44			19	Life.....	51	110	132	26, 30
Jungle.....	45	102		19, 21	Light on dolphin.....	38			16
					Linton.....	27	95		19
Kaiser.....	28	95		20	Linton Landing light.....	43			19
Kalama.....	22	90		16	Linton reference mark.....	27			
					Lion Tree.....	65			34

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
	Page	Page	Page	Number		Page	Page	Page	Number
Little Black Rock	78			44	Marked tree No. 3 (Tillamook Bay)	80			
Loaf	63	119	132	26,27	Marked tree No. 4 (Coos Bay)	78			
Locks	46	105		22	Marked tree No. 4 (Tillamook Bay)	80			
Lodge	79				Marked tree No. 5 (Coos Bay)	78			
Log (Lincoln County)	58	116		30,31	Marked tree No. 6 (Coos Bay)	78			
Log (Tillamook County)	56	113		28	Marked tree No. 7 (Coos Bay)	78			
Log boom, last pile	37			16	Marked tree No. 8 (Coos Bay)	79			
Loggie	68	122		36	Marked tree No. 10 (Coos Bay)	79			
Lokamin	17	83		14	Marked tree No. 11 (Coos Bay)	79			
Loma (Curry County)	73	125		42	Marked tree No. 12 (Coos Bay)	79			
Loma, 1873 (Curry County)	71	124		41	Marked tree No. 13 (Coos Bay)	79			
Lone Knob	72	125		42	Marked tree No. 14 (Coos Bay)	79			
Lone Rock	48			22	Marked tree No. 15 (Coos Bay)	79			
Long Point	76	130		45	Marked tree No. 16 (Coos Bay)	79			
Long Ridge	51	110	133	39	Marked tree No. 17 (Coos Bay)	79			
Long Rock	77			44	Marked tree No. 22 (Coos Bay)	79			
Lookout (Coos County)	70			35	Marked tree No. 24 (Coos Bay)	79			
Lookout (Curry County)	71	124		41	Marsh (Coos County)	68	122		36
Lookout (Skamania County)	46	104		22	Marsh (Douglas County)	65			33
Lookout Point (U. S. E.)	69	122		35	Marsh (U. S. E.), (Clatsop County)	33	97		13
Loomis	54	112		23	Marsh (U. S. E.), (Coos County)	68	122		35
Low (Del Norte County, Cal.)	76	130		45	Marshfield	79			
Low (Lincoln County)	59	117		31	Marshfield cannery	69			36
Low Dune	74	127		43	Marshfield front range	69			36
Lower Dike light	62			32	Marshfield Hill	50	108	133	36,37
Lower fish wheel	47			22	Marshfield rear range	69			36
Lower flagstaff, Vancouver	46	105		21	Marshfield U. S. G. S. bench mark	69		133	36
Lower gauge pile light	33			12,13	Marsh Point 1	80			
Lower Point	45	102		21	Marsh Point 2	80			
Lower Sands light	32			12	Martin	79			
Lower Skumaquea light	20			13,14	Martin 3 (U. S. E.)	23	91		16,17
Lower Willow Bar range front light	42			18	Martin 3 (U. S. E.) reference mark	23			
Lower Willow Bar range rear light	42			18	Martins Bluff	18	85		16,17
Low Point	73	125		42	Martins Bluff reference mark	18			
Low Rock	74	127		43	Martins Island	80			
Lucca Mill, pipe	46			21	Mary	49	105		26
Lutheran Church, spire	69			36	Mast	60			30
					Maxwell	39	99		17
McClures school eupola, flagstaff	33			12	Mays	45	102		21
McGowan's cannery	48			22	Meadow	54	112		23
Mahry	66	120		36	Meadows	40	100		17,20
Mahry (U. S. E.)	69	122		36	Megler's fish house, south gable, flag	34			13
Mack	58	115		30	Megler's water tank, spindle	32			12
Macks Arch, highest point	71			41	Memalust Head	56	113		28
Macks Point	71	124		41	Merchant	79			
Madden	50	109	133	37,40	Merchant's tank	69			36
Made	58	116		30	Merrill	18	85		16,17
Mann	41	101		20	Methodist Church spire, Kalama	36			16
Maple	49	106	132	26,27	Methodist Church spire, Portland	41			19
Maple Hill	18	85		17	Miami	50	107		24
Marconi northeast wireless, tallest pole, Astoria	33			12	Middle (Clarke County, Wash.)	27	94		18
Marconi southwest wireless, Astoria	33			12	Middle (Tillamook County)	56	113		28
Marked tree A	79				Middle fish wheel	47			22
Marked tree Anderson	79				Middle Ground light	61			30
Marked tree B	79				Middle Peak Neahkahnie	54			24
Marked tree Government Island	80				Middle reference mark (Clarke County, Wash.)	27			
Marked tree Mosman	79				Midway	67	121		35
Marked tree No. 1 (Columbia River)	47			21	Midway Point (U. S. E.)	68	122		35
Marked tree No. 1 (Coos Bay)	78				Mill (Coos County)	79			
Marked tree No. 1 (Tillamook Bay)	80				Mill (Coos County, Coos Bay)	66	120	133	36
Marked tree No. 2 (Coos Bay)	78				Mill (Lincoln County)	59	117		31,32
Marked tree No. 2 (Tillamook Bay)	80				Mill (U. S. E.), (Columbia County)	21	88		15
Marked tree No. 3 (Coos Bay)	78				Mill (U. S. E.), (Cowlitz County)	21	90		16
					Mill 4 (U. S. E.)	62			31,32

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
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Miller.....	72	125		42	Nine (U. S. E.) (Multnomah County).....	30	97		18, 19
Miller Sands fish house flagpole.....	34			13	Nine (U. S. E.) reference mark (Columbiana County).....	24			
Mills.....	44	101		20	Nineteen (U. S. E.).....	30	97		18, 19
Mill, smokestack.....	65			33	Nineteen 2 (U. S. E.).....	31	90		18, 19
Mineral soap factory, Rainier.....	37			15	Noah.....	50	108	133	37
Mocks Bottom light.....	43			19	North hase, Coos Bay.....	67	121		35
Moffat.....	46	104		22	North Bend.....	78			
Montgomery.....	28	96		20	North Bend (U. S. E.).....	69	122		36
Monticello.....	36	99		15	North Bend 2.....	66	120		36
Monument, General Land Survey.....	19	87	133	20	North Chetko.....	73	126		42
Morgan.....	41	100		20	North End.....	64			33
Morgans 2 (U. S. E.).....	26	94		18	North Head lighthouse.....	16			12
Morgans 2 (U. S. E.) reference mark.....	27				North Sand 2.....	65			34, 36
Morgan's dwelling.....	80				North Sands.....	78			
Morgan's new barn, south gable.....	56			28	North Slough.....	66	120		36
Morgan's Wharf light.....	42			18	North Slough 89.....	66	120		36
Morrison.....	53	111		23	North Spit.....	67	121		35
Mound (Coos County).....	79				Northwest Seal Rock.....	73	126		44
Mound (Del Norte County, Cal.).....	75	129		44, 45	North Winchuck.....	73	126		42, 43
Mound, 1914 (Del Norte County, Cal.).....	51	110	133	39	N. P. R. R. bridge light, center of draw.....	44			19
Mountain Lumber Co. stack.....	38			16	Nusom's house, west gable.....	37			15
Mountain top, back of Westport.....	36			14	Nye.....	60	118		30
Mountain View dairy farm windmill.....	42			18	Oak Ridge.....	41	100		20
Mount Chetko or Mount Emery.....	52		133	38	Ocean.....	67	121		35
Mount Coffin.....	18	84		15	Odd Fellows Monument.....	69			36
Mount Coffin light.....	37			15	Oil works stack.....	35			12
Mount Coffin reference mark.....	18				Old.....	22	90		15, 16
Mount Emery or Mount Chetko.....	52		133	38	Old barn, gable.....	39			16, 17
Mount Pleasant.....	45	103		21	Old church heltry, front spindle.....	42			18
Mount Pleasant Church.....	47			22	Old garhage plant, chimney.....	44			20
Mount Solo.....	17	84		14, 15	Old hotel, northeast corner.....	60			30
Mount Zion.....	46	103		22	Old house (Lincoln County).....	61			31
Mouth.....	36	98		14	Old house, yellow terra cotta chimney.....	39			17
Mud (Lincoln County).....	59	116		30, 31	Old Jim Crow (U. S. E.).....	33	98		13
Mud (Multnomah County).....	27	94		18	Old mill smokestack.....	65			33
Mud (Tillamook County).....	55	113		28	Old orchard.....	39	99		17
Mud (Wahkiakum County).....	20	88		14	Old Point Ellice (U. S. E.).....	33	97		12
Mud reference mark No. 1 (Multnomah County).....	27				Old Rock.....	61			30
Mud reference mark No. 2 (Multnomah County).....	27				Old Tongue (U. S. E.).....	33	98		12, 13
Mullaney.....	57	115		29	Old Wharf.....	61			30, 31
Mussel Point.....	77	131		39	Old windmill, high tank.....	42			18
Mussel Rock.....	78			44	One 2 (U. S. E.).....	25	92		17
Navy east wireless, Astoria.....	31			12	One 2 (U. S. E.) reference mark.....	25			
Navy west wireless, Astoria.....	33			12	One 3 (U. S. E.).....	27	94		18
Neahkahnie.....	49	107		24	One 3 (U. S. E.) reference mark.....	27			
Near (Del Norte County, Cal.).....	76	130		45	Oneonta.....	46	104		22
Near (Lincoln County).....	59	117		31, 32	Onion.....	50	108		37
Nelson.....	41	100		17, 20	Onion Peak.....	54			24
Nelson (U. S. E.).....	68	122		35	Oregon-California Boundary Monument.....	73	126		43
Nequally.....	17	84		14	Oregonian.....	19	87	133	20
Nestugga.....	57	114		29	Otto.....	73	126		42, 43
Nestugga Bay northwest hase.....	58	115		29	Out.....	58	116		30, 31
Nestugga Bay southeast base.....	58	115		29	Outermost Rock Tillamook Bay.....	54			24, 25, 28
Net 2 (U. S. E.).....	21	89		15	Outer Turtle Rock.....	77			39
New.....	72	125		41	P (U. S. E.).....	29	96		19
New courthouse dome, St. Helens.....	40			17	P (U. S. E.) reference mark.....	29			
New Enterprise Landing, front light.....	38			16	Pack Saddle.....	51	110	133	38, 39
New house, chimney.....	42			18	Patch.....	74	127		43
New house near Bailey's, east gable.....	56			28	Patricks Pinnacle.....	77	131		39
New range, front light.....	38			16					
New range, rear light.....	38			16					
Nine (U. S. E.) (Columbiana County).....	24	92		17					

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
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Patrick's Point south.....	77	131		39	Portland:				
Pavilion.....	60			30	Bench mark U. S. G. S.....	19			20
Peacock Split range front light.....	32			12	Congregational Church spire.....	42			19
Peacock Split range rear light.....	32			12	Courthouse dome.....	42			19
Peak.....	73	126		43	Customhouse dome.....	41			19
Pine No. 6.....	53		133	39	Episcopal Church spire.....	41			19
Pine No. 8.....	53		133	39	Journal spire.....	44			19
Pond.....	27	95		18, 19	Latitude.....	19	87		20
Peninsula Lumber Co., black tank.....	39			17	Longitude.....	19	87		20
Peninsula Lumber Co., stack.....	43			19	Methodist Church spire.....	41			19
Pen reference mark.....	27				Tall building, weathervane.....	44			19
Pest.....	67	121		35	Union Depot (U. S. E.).....	30			19
Phone.....	61			30	Waterworks pumping tower.....	42			
Pierce.....	66	120	133	36	Y. M. C. A. east wireless.....	44	101		19
Pigeon 2.....	67	121		35	Y. M. C. A. west wireless.....	44	101		19
Pigeon astronomic.....	79				Portland woolen mills, red tank.....	44			19
Pile (Grays Bay).....	34			13	Port Orford:				
Pile (Lincoln County).....	59	117		31	Astronomic.....	70	123		40
Pillar Hill Tree.....	80				Astronomical 2.....	50	109	133	37, 38, 40
Pillar Rock.....	35			13	North base.....	70	123		40
Pillar Rock cannery flagpole.....	35			13	South base.....	70	123		37, 40
Pillar Rock Channel range front light.....	35			13	Post light, Sand Island.....	33			12
Pillar Rock Channel range rear light.....	35			13	Post Office Bar lower light.....	43			18, 19
Pilot Knob.....	52			37	Post Office Bar range front light.....	43			18, 19
Pine (Coos County).....	79				Post Office Bar range rear light.....	43			18, 19
Pine (Del Norte County, Cal.).....	75	128		44	Potter.....	28	95		20
Pine (Lincoln County).....	59	117		31	Powder house, low stack.....	40			17
Pine (Tillamook County).....	80				Presbyterian Church, Vancouver.....	46			21
Pine Bush.....	75	128		44	Preston.....	76	130		45
Pine Hill (Curry County).....	73	126		42	Preston 2.....	75	129		45
Pine Hill (Curry County, near Port Orford).....	70	123		40	Preston Peak.....	52	111	133	39
Pine Ridge.....	77	130		39, 45	Preston Peak, south.....	52		133	39
Pinnacle Rock.....	54	112		23	Prune Hill.....	45	102		21
Pistol River.....	71	124		41	Puget.....	35	98		14
Pitchee Point.....	55	113		24, 25, 28	Pulliam's fish house, southeast corner.....	34			12, 13
Plateau.....	63	119	132	28, 27	Pyramid.....	73	126		43
Point (Tillamook County, Tillamook Bay).....	53	111		24	Pyramid Rock.....	55	113		28
Point (Tillamook County, Nestugga Bay).....	57	114		29	Pyramid tree.....	48			22
Point, 1869 (Del Norte County, Cal.).....	75	129		44, 45	Quarry.....	45	103		21
Point, 1871 (Del Norte County, Cal.).....	76	130		45	Quarry (U. S. E.).....	20	88		15
Point (U. S. E.).....	19			12	Quartermasters Wharf.....	45	102		19, 21
Point Adams.....	16	83		12	Quicksand.....	69			35
Point Adams life-saving station.....	32			12	Quigley.....	41	101		20
Point Adams unused lighthouse.....	16			12	Quill.....	58	116		30
Point Basalt.....	35	98		14	Quinn.....	17	83		13, 14
Point Ellice.....	16	83		12	R (U. S. E.).....	28	96		19
Point Ellice (U. S. E.).....	19	87		12	R (U. S. E.) reference mark.....	28			
Point Ellice (U. S. E.) reference mark No. 1.....	19				Rail (Cowlitz County).....	22	90		15, 16
Point Ellice (U. S. E.) reference mark No. 2.....	19				Rail (Lincoln County).....	59	117		30, 31
Pole.....	35	98		14	Railroad.....	46	103		22
Pole No. 1 (Tillamook Bay).....	80				Railroad depot, northwest gable.....	46			21
Pole No. 2 (Tillamook Bay).....	80				Railway water tank.....	49			22
Pole No. 3 (Tillamook Bay).....	80				Rainier.....	17	84		15
Pole No. 4 (Tillamook Bay).....	80				Rainier 2 (U. S. E.).....	21	89		15
Pollywog.....	51	110	133	38	Rainier:				
Pond.....	75	128		44	Church steeple.....	37			15
Pony.....	66	120		34, 35, 36	Mineral soap factory.....	37			15
Pony Point (U. S. E.).....	69	122		35	Range 2 (U. S. E.).....	26	94		18
Port.....	58	115		30	Range 2 (U. S. E.) reference mark.....	26			
Porter.....	66	120	133	36	Raspberry (U. S. E.).....	20	88		13
					Rattle.....	51	110	133	39
					Rauer.....	45	102		19
					Rear range 1.....	61			31

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Rear range 2.....	61			31	Rocky Point (Wahkiakum County).....	17	83		13
Rear range 3.....	62			32	Rocky Point 2.....	20	87		13
Rear range 4.....	62			32	Rocky Point 2 reference mark.....	20			
Rear range 5.....	62			32	Rocky Point light.....	34			12, 13
Rear range 6.....	62			32	Rocky Prairie.....	71	124		41
Rear range 7.....	62			32	Rocky Ridge.....	18	85		16
Rear range 8.....	62			32	Roman.....	49	105		26, 27
Rear range 9.....	62			32	Rooster Rock.....	47			21
Rear range 10.....	63			32	Ross (Coos County).....	79			
Rear range 11.....	63			32	Ross, 1889 (Coos County).....	68	122		36
Red.....	59	117		31, 32	Round (Curry County).....	70	123		40
Red barn, cupola (Columbia County).....	38			16	Round (Del Norte County, Cal.).....	75	128		44
Red barn, cupola (Multnomah County).....	48			22	Round (Lincoln County).....	60			30
Red Bush.....	72	125		42	Round barn.....	44			19
Redding Rock.....	77	130	133	39	Round Point.....	80			
Redding Rock lighthouse.....	53			39	Round Rock.....	76	130		45
Red house, chimney.....	42			39	Round Top.....	56	114	132	25
Red mill, spindle.....	42			18	Russell (Coos County).....	66	120		36
Red Mound.....	72	124		42	Russell (Cowlitz County).....	40	99		17
Red Mountain (Curry County).....	52			38	S (U. S. E.).....	19			12
Red Mountain (Del Norte County, Cal.).....	51	110	133	39	Saddle Mountain (Clatsop County).....	49	107		23
Red Point (Curry County).....	73	126		42, 43	Saddle Mountain (Curry County).....	52		133	38
Red Point (Del Norte County, Cal.).....	74	128		44	Saddle Mountain 2.....	49		133	23
Red Rock (Curry County).....	71	123	133	38, 41	St. George.....	75	128		44, 45
Red Rock (Tillamook County).....	57	115		29	St. George:				
Red tank on bluff, spindle.....	44			19	North base.....	75	128		44, 45
Redwood.....	53	111		24	Reef lighthouse.....	52			39
Reed (Clarke County, Wash.).....	18	86		17	South base.....	75	129		44, 45
Reed (Coos County).....	79				St. Helens:				
Reeder's house, north chimney.....	42			18	Bar range front light.....	39			17
Reeders Point light.....	42			18	Bar range rear light.....	39			17
Relief.....	79				Church.....	40			17
Remington.....	45	103		21	Congregational Church.....	40			17
Republic Split range front light.....	32			12	Jetty light.....	40			17
Republic Split range rear light.....	32			12	Lumber Co. north stack.....	40			17
Ridge (Coos County).....	66	120		35	Lumber Co. pole near gable.....	40			17
Ridge (Del Norte County, Cal.).....	74	127		44	New courthouse dome.....	40			17
Ridge 2.....	67	121		35	School, small cupola.....	40			17
Ridge (U. S. E.).....	25	93		17	St. James Cburch, Vancouver.....	46			21
Ridge Knob.....	71	124		41	St. John.....	28	95		20
Ridge (U. S. E.) reference mark.....	25				St. Johns:				
Rinearson.....	17	84		14, 15	Fire Hall flagstaff.....	44			19
River.....	19	87	133	20	High School.....	44			19
Rivulet.....	54	112		23	Lumber Co. inshore stack.....	44			19
Road.....	59	116		30, 31	Lumber Co. tank.....	44			19
Rock (Cowlitz County).....	22	90		16	St. Marys Church, McGowans.....	31			12
Rock (Del Norte County, Cal.).....	76	130		39, 45	St. Marys Hospital cross, Astoria.....	16			12
Rock, 1914 (Del Norte County, Cal.).....	53			39, 45	Sallal.....	79			
Rock (U. S. E.).....	61			31, 32	Salmon.....	49	107	132	25
Rock crusher, southeast stack.....	40			17	Salmon Mountain.....	52		133	37
Rock Knoll.....	80				Sand (Del Norte County, Cal.).....	75	123		44
Rock off Cape Mears.....	80				Sand (Multnomah County).....	27	95		18, 19
Rock Point.....	55	113		28	Sand (Tillamook County).....	56	113		28
Rock reference mark No. 1 (Cowlitz County).....	22				Sand, 1908 (Tillamook County).....	55	113		28
Rock reference mark No. 2 (Cowlitz County).....	22				Sand Beach (U. S. E.).....	68	122		35
Rock, southerly of two south of lighthouse.....	63			26, 27	Sand Dune.....	57	115		29
Rocky Butte (Curry County).....	73	126		42, 43	Sand Flower.....	71	124		41
Rocky Butte (Multnomah County).....	19	86	133	20, 21	Sand Hill (Curry County).....	72	125		42
Rocky Peak.....	52		133	37, 38	Sand Hill (Tillamook County).....	56	113		28
Rocky Point (Curry County).....	70	123		40	Sand Hill 2.....	64	120	132	33
					Sand Hill 3.....	64			33
					Sand Hill tree.....	80			
					Sand Island light.....	32			12
					Sand Island post light.....	33			12

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
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Sand reference mark (Multnomah County).....	27				Sherman.....	53	111		23
Sands.....	19	87		12	Sheeringhousen.....	41	100		20
Sandstone Point.....	55	113		28	Shersinger.....	57	114		29
Sandy Beach.....	80				Shingle mill, stack, Ahle Point.....	38			16
Sandy Island Channel range front light.....	38			16	Shobert.....	40	100		17
Sandy Island House pipe.....	38				Shobert chimney.....	80			
Sandy Point (Curry County).....	72	125		42	Shortis chimney.....	34	98		12, 13
Sandy Point (Wahklakum County).....	36	98		14	Shortridge.....	57	115		29
San Sebastian.....	71	123		41	Signboard.....	48			22
Sauvies Island.....	80				Simpson.....	66	120		34, 36
Saw.....	60	118		32	Sister Rock, 1871.....	76	130		45
Sawmill, pipe.....	46			21	Sister Rock, 1907.....	52			37, 38
Sawmill, stack.....	48			22	Sister's farm.....	45	102		19
Sawmill, west stack.....	43			19	Sisters Knob.....	72	124		42
Sawtooth, North.....	53		133	39	Slwash.....	79			
Sawtooth, South.....	53		133	39	Six (U. S. E.) (Clarke County, Wash.).....	24	92		17
Scappoose.....	18	86		17, 20	Six (U. S. E.) (Multnomah County).....	30	97		18
Scappoose Johnson fish house, flag northwest gable.....	34			13	Six (U. S. E.) reference mark (Clarke County, Wash.).....	24			
Scarboro Hill.....	16	83		12, 23	Sixes.....	50	109	133	37, 40
Scarboro Hill 2.....	16	82	133	12, 23	Sixteen (U. S. E.).....	30	97		18, 19
School.....	27	94		18	Skamokowa (U. S. E.).....	35	98		13, 14
Schoolhouse, belfry (Clarke County, Wash.).....	42			18	Skeppernawin Creek.....	80			
Schoolhouse, chimney (Lincoln County).....	61			30, 31	Skiff.....	79			
Schoolhouse, cupola (Lincoln County, Toledo).....	63			32	Skull.....	75	128		44
Schoolhouse, cupola (Marshfield).....	69			36	Skumaquea.....	17	83		13, 14
Schoolhouse, flagpole, Rainier.....	37			15	Skumaquea School square cupola.....	35			13, 14
Schoolhouse, Washougal.....	47			21	Skunk Cahhage Ridge.....	36	99		14
School, Kalama.....	38			16	Slah.....	79			
School reference mark.....	27				Slaughter 2 (U. S. E.).....	20	88		15
School, small cupola, St. Helens.....	40			17	Slaughter 2 (U. S. E.) reference mark No. 1.....	20			
Schooner.....	49	106		27	Slaughter 2 (U. S. E.) reference mark No. 2.....	20			
Schroeder.....	64			33	Slaughterhouse, east gable.....	69			36
Schumacher.....	71	124		41	Slaughter Island Bar range rear light.....	37			15
Scott.....	28	95		19, 20	Slip.....	59	117		31
Scott reference mark.....	28				Slope.....	59	117		31
Sea.....	60	118		30	Slough.....	55	113		28
Seal (U. S. E.).....	33	97		13	Slue (Columbia County).....	22	90		16
Sea Lion.....	66			34	Slue (Lincoln County).....	59	117		31
Seal Point.....	72	125		41	Slue reference mark No. 1 (Columbia County).....	22			
Seaside House cupola.....	54	112		23	Slue reference mark No. 2 (Columbia County).....	22			
Second Peak north of Preston Peak.....	52	111	133	39	Small hill southwest of Bosley.....	52		133	38
Secrist.....	18	86		20	Small house on shore, pipe.....	37			15
Seely.....	53	111		24	Small Rock.....	78			44
Settlers Point.....	34	98		13	Small white barn, north gable.....	47			22
Seven (U. S. E.).....	31	97		18	Smith (U. S. E.).....	33	97		12
Seven 2 (U. S. E.).....	24	92		17	Smith Hill.....	72	124		41, 42
Seven 2 (U. S. E.) reference mark.....	24				Smith Point.....	16	82		12
Seventeen (U. S. E.).....	30	97		18, 19	Smith Point iron chimney, Astoria.....	32			12
Seventeen 2 (U. S. E.).....	31	90		18, 19	Smith Point light.....	32			12
Shade.....	61	118		30, 31	Smith River.....	65			33
Sharp Point.....	77	131		39	Smokestack, cannery.....	65			33
Shaw.....	45	101		19, 21	Smyth.....	76	130		45
Sheep.....	72			41, 42	Smyth 2.....	76	129		45
Sheep Hill.....	57	114	132	29	Snag (Coos County).....	79			
Shell.....	59	117		31	Snag (Lane County).....	63	119	132	26, 27
Shell (Del Norte County, Cal.).....	75	129		44, 45	Snag (U. S. E.).....	35	98		13
Shell (Lincoln County).....	59	117		31	Snipe.....	64			33, 34
Shell Point.....	50	107	132	24, 25, 28	Snodgrass.....	71	124		41
Shepard.....	46	103		22	Soap.....	59	118		32
					Soft.....	58	116		30, 31

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
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South base, Coos Bay.....	67	121		35	Tansy Point 2.....	16	82		12
South Point 2.....	64			33	Taylor (Clatsop County).....	20	87		12, 13
Southwest Peak Neahkanie.....	54			24	Taylor (Curry County).....	73	125		42
South west Seal Rock Point A.....	78			44	Taylor Sands light.....	34			12, 13
Southwest Seal Rock Point B.....	77			44	Taylor School cupola, Astoria.....	32			12
Spit (Lincoln County).....	59	117		31, 32	Telegraph.....	67	121		35
Spit (Tillamook County).....	55	113		28	Ten.....	20	88		13, 14
Split Rock.....	77	131		39	Ten (U. S. E.), (Clarke County).....	24	92		17
Spring.....	70			34, 35	Ten (U. S. E.), (Multnomah County).....	30	97		18, 19
Springville.....	28	95		20	Tenasillhee.....	35	98		14
Spruce.....	57	115		29	Ten Mile.....	66			34
Spur (Del Norte County, Cal.).....	74	127		43	Ten reference mark.....	20			
Spur (Lane County).....	63	119	132	26, 27	Ten (U. S. E.) reference mark (Clarke County).....	24			
Squaw.....	74	128		44	Thicket.....	80			
Squirrel.....	50	109	133	37, 38	Thirteen (U. S. E.).....	30	97		18, 19
Stack.....	51	109	133	38	Thirteen 2 (U. S. E.).....	31	90		18, 19
Stack fish house.....	35			13	Thirty (U. S. E.).....	30	97		19
Stackhouse.....	46	104		22	Thirty-eight (U. S. E.).....	29	96		19
Stack, Mountain Lumber Co.....	38			16	Thirty-eight 2 (U. S. E.).....	28	96		19
Stack, Western Lumber Co.....	37			15, 16	Thirty-five (U. S. E.).....	31			19
Stage Lading.....	64			33	Thirty-four (U. S. E.).....	30	96		19
Standard Oil Co., white tank.....	44			19	Thirty-nine (U. S. E.).....	28	96		19
Stansbury.....	45	101		21	Thirty-nine 2 (U. S. E.).....	28	96		19
Star (U. S. E.).....	31			19	Thirty-one (U. S. E.).....	30	97		19
Star Rock.....	78			44	Thirty-seven (U. S. E.).....	28	96		19
Stave mill, stack.....	69			36	Thirty-six (U. S. E.).....	29	96		19
Stave mill (U. S. E.).....	69	122		36	Thirty-six 2 (U. S. E.).....	31			19
Steamboat Rock.....	76	129		45	Thirty-three (U. S. E.).....	30	97		19
Stenger.....	47	105		21	Thirty-two (U. S. E.).....	30	97		19
Stewart's house, south gable.....	80				Thistle.....	41	101		20
Stick.....	75	128		44	Thomas Hill.....	72	125		41
Stoughton.....	17	84		14	Thomas Point.....	72	125		41
Stream.....	62	118		32	Three 3 (U. S. E.).....	27	95		18
Stump (Coos County).....	66			36	Three 3 (U. S. E.) reference mark.....	27			
Stump (Lincoln County).....	58	116		30, 31	Three Tree Island Shoal light.....	43			18, 19
Stump (Tillamook County).....	55	113		28	Three Tree Point.....	17	83		13
Stump (Wahkiakum County).....	20			13, 14	Three Tree Point (U. S. E.).....	20	88		13
Sugar.....	50	108	133	37	Three Tree Point light.....	35			13
Sugar Loaf.....	77			39	Tibbets.....	28	96		20
Sugar Loaf 2.....	63	119	132	26, 27	Tillamook Bay east base.....	55	113		28
Summer.....	70			34, 35	Tillamook Bay west base.....	55	113		28
Sundown.....	71	123		38, 41	Tillamook Head.....	49	107	133	23
Sundown 2.....	51	109	133	38, 41	Tillamook Rock lighthouse.....	54			23
Surf.....	67			35	Timber Knob.....	79			
Swamp.....	74	128		44	Timmerman.....	68	121		36
Swan Island Bar lower light.....	43			19	Toledo Beacon 10.....	62			32
Swan Island Bar upper light.....	43			19	Toledo Beacon 12.....	62			32
Swan Island Channel range front light.....	43			19	Tongue (U. S. E.).....	20	87		12, 13
Swan Island Channel range rear light.....	43			19	Tongue Point.....	17	83		12, 13
Swan Island range front light.....	43			19	Tongue Point light.....	35			12, 13
Swan Island range rear light.....	43			19	Tongue Point Neck.....	34	98		12, 13
T (U. S. E.).....	29	96		19	Tongue (U. S. E.) reference mark.....	20			
T (U. S. E.) reference mark.....	29				Tophet.....	67	121		35
Table.....	49	106	132	26	Tower Rock.....	52			40
Table Cliff.....	18	86		17	Trail (Coos County).....	78			
Taggart's Bluff.....	45	102		21	Trail (Curry County).....	72	125		42
Talbert.....	57	115		29	Trail (Douglas County).....	49	106	132	27, 33
Tall building, weather vane, Portland.....	44			19	Tree (Columbia County).....	20			15
Tall post.....	48			22	Tree (Lane County).....	63	119	132	26, 27
Tangent (U. S. E.).....	21	88		15	Tree on Rocky Butte.....	80			
Tank, Beaver Lumber Co.....	38			16	Tunnel Point tree.....	47			21
Tank, oil, large black.....	38			16	Turn.....	63	119	132	26, 27
Tansy Point.....	16	83		12	Twelve (U. S. E.).....	30	97		18, 19

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
	Page	Page	Page	Number		Page	Page	Page	Number
Twenty (U. S. E.).....	30	97		18,19	W 9 (U. S. E.) reference mark.....	26			
Twenty-eight (U. S. E.).....	30	97		19	W 10 ₂ (U. S. E.).....	26	93		18
Twenty-five (U. S. E.).....	30	97		19	W 10 ₂ (U. S. E.) reference mark.....	26			
Twenty-four (U. S. E.).....	30	97		19	W 11 (U. S. E.).....	25	93		17,18
Twenty-four 2 (U. S. E.).....	31	90		19	W 12 ₂ (U. S. E.).....	26	93		18
Twenty-nine (U. S. E.).....	30	97		19	W 14 (U. S. E.).....	25	93		17,18
Twenty-one (U. S. E.).....	30	97		18,19	W 14 (U. S. E.) reference mark.....	26			
Twenty-seven (U. S. E.).....	30	97		19	W 16 (U. S. E.).....	25	93		17,18
Twenty-six (U. S. E.).....	30	97		19	W 16 (U. S. E.) reference mark No. 1.....	25			
Twenty-six 2 (U. S. E.).....	31	90		19	W 16 (U. S. E.) reference mark No. 2.....	25			
Twenty-three (U. S. E.).....	30	97		19	Walker Island Dike light.....	36			14,15
Twenty-two (U. S. E.).....	30	97		19	Walker Island Light.....	36			14,15
Twin Mountain.....	46	103		22	Wallaces Island.....	36	99		14
Two (U. S. E.).....	25	92		17	Wallicut (U. S. E.).....	19			12
Two 2 (U. S. E.).....	27	94		18	Warren (Columbia County).....	18	85		15
Two 2 (U. S. E.) reference mark.....	27				Warren (Multnomah County).....	46	104		22
Umpqua.....	65			33	Warren, 1903 (Columbia County).....	19	86	133	20
Umpqua north base.....	64			33	Warrendale Church.....	48			22
Umpqua River lighthouse.....	64		132	33	Warren's cannery.....	48			22
Umpqua south base.....	64			33	Warrlor (U. S. E.).....	24	92		17
Union Depot, Portland.....	30			19	Warrior (U. S. E.) reference mark.....	24			
Union Oil Co. white tank, knob.....	43			19	Warrior Rock lighthouse, ventilator.....	40			17
United States buoy depot flag.....	33			12	Warriors Point.....	40	100		17
United States quarantine station flagpole.....	32			12	Washougal.....	45	102		21
United Wireless Co. pole.....	40			17	Washougal Hall flagstaff.....	47			21
University flagstaff.....	44			19	Washougal schoolhouse.....	47			21
Unknown.....	65			34	Water (Clatsop County).....	20	87		13
Unpainted house, stovepipe.....	39			17	Water (Lincoln County).....	58	116		30,31
Upper Astoria.....	80				Waterworks pumping tower, Port- land.....	42			
Upper Bluff.....	77	131		39	Watts.....	23	95		20
Upper fish wheel.....	48			22	Waud.....	28	95		20
Upper flagstaff, Vancouver.....	47			21	Weather Bureau tower flagpole.....	33			12
Upper Skumaquea light.....	36			14	Welch.....	35	98		13,14
Upper Willow Bar range front light.....	42			18	Welch's fish house, northeast gable.....	35			13,14
Upper Willow Bar range rear light.....	42			18	West.....	70	123		40
Vancouver:					West end of Jetty.....	31	97		12
Bridge, center of draw.....	43			19	Westerly of two trees.....	80			
Episcopal Church.....	46			21	Westport (Clatsop County).....	17	83		14
Lower flagstaff.....	46	105		21	Westport (Coos County).....	50	108	133	37
Presbyterian Church.....	46			21	West stack, Beaver Lumber Co.....	38			16
St. James Church.....	46			21	Wet.....	60			30
Upper flagstaff.....	47	105		21	Whale.....	65			34
Vine Maple.....	57	114		29	Whale Rock.....	77			44
Violet.....	68	122		35,36	Whalers Island.....	76	129		45
W (U. S. E.).....	29			19	Wharf (Clatsop County).....	20	88		13
W 1 (U. S. E.).....	26	94		18	Wharf (Lincoln County).....	59	117		31
W. 2 ₁ (U. S. E.).....	26	94		18	Wheeler.....	65			34
W 2 ₁ (U. S. E.) reference mark.....	26			18	White (Coos County).....	79			
W 3 (U. S. E.).....	26	94		18	White (Del Norte County, Cal.).....	75	129		44,45
W 3 (U. S. E.) reference mark.....	26			18	White (Douglas County).....	50	107		37
W 4 ₁ (U. S. E.).....	26	94		18	White house, chimney.....	39			16
W 4 ₁ (U. S. E.) reference mark.....	26			18	White house, chimney, back.....	39			17
W 5 ₁ (U. S. E.).....	26	93		18	White house, chimney, small.....	47			22
W 5 ₁ (U. S. E.) reference mark.....	26			18	White house, middle chimney.....	42			18
W 6 (U. S. E.).....	26	94		18	White house, near wharf, north chim- ney.....	39			17
W 6 (U. S. E.) reference mark.....	26			18	White house, north gable.....	48			22
W 7 ₁ (U. S. E.).....	26	93		18	White house, terra-cotta pipe.....	38			16
W 7 ₁ (U. S. E.) reference mark No. 1.....	26			18	White Knob.....	76	130		45
W 7 ₁ (U. S. E.) reference mark No. 2.....	26			18	White Point 2.....	68	121		36
W 8 ₁ (U. S. E.).....	26	94		18	White Point 3.....	66	120	133	36
W 9 (U. S. E.).....	26	93		18	White tank inshore, one of two.....	44			19
					White tree, three prongs.....	37			15
					Whitewashed Cliff.....	79			

Station	Position	Description	Elevation	Sketch	Station	Position	Description	Elevation	Sketch
	Page	Page	Page	Number		Page	Page	Page	Number
Whitewashed sapling.....	79				Woody Point.....	76	130		45
W. house, west gable.....	80				Wreck.....	78			
Wikman.....	80				Wreck Tacoma.....	64			33
Willamet.....	18	86		20	Wynell.....	75	129		44,45
Willamette River range front light...	43			18	Yank.....	74	128		44
Williams.....	47	105		21	Yaq.....	58	116		30,31
Willow Bar.....	80				Yaquina Bar range front light.....	61			30
Willows.....	80				Yaquina Bar range rear light.....	61			30
Wilson (Curry County).....	70	123		40	Yaquina east base.....	58	116		30
Wilson (Del Norte County, Cal.).....	76	130		45	Yaquina Head lighthouse.....	51		132	26
Wind.....	64	119	132	33	Yaquina Jetty light.....	60			30
Windmill on bluff.....	44			19	Yaquina lighthouse, old tower.....	51			26,30
Windmill on unpainted tower.....	42			18	Yaquina west base.....	58	116		30
Windmill white tank.....	43			18	Yellow Bluff.....	34	98		13
Winter.....	70			34	Yellow house, south chimney.....	42			18
Wintler.....	45	101		21	Yokam.....	78			
Wire.....	58	115		30	Yokam 2.....	79			
Wise.....	58	116		30,31	Y. M. C. A. east wireless, Portland..	44	101		19
Wood 2 (U. S. E.).....	21	88		15	Y. M. C. A. west wireless, Portland..	44	101		19
Woodedge.....	75	129		44,45	Youngs Bay Bridge, center of draw..	32			12
Woodland.....	78				Youngs River.....	80			
Woodland 2.....	79								
Woods.....	17	84		14					

