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DIRECTORY

FOR THE

PACIFIC COAST OF THE UNITED STATES,

REPORTED TO

THE SUPERINTENDENT OF THE U. S. COAST SURVEY,

BY

GEORGE DAVIDSON, Assistant.

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ERRATA.

Page 5, line 17 from bottom, for "of Sergus" read "Las Sergas" The full title of the book is "Las Sergas del Mey Esforzado Cabalero Esplandian hijo del Excelente re Amadis de Gaula."

Page 5, line 13 from bottom, for "Sergus" read "Sergas."

Page 8, line 7, after the word "pages" insert "45-49."

Page 18, line 7, after the word "page" insert "15."

Page 19, line 16 from bottom, before the word "side" insert "NW."

Page 21, line 10 from bottom, for "12".9" read "11".6."

Page 23, line 9, for "10".2" read "09".8."

Page 25, line 17 from bottom, for "bend" read "trend."

Page 29, line 12, for "58".1" read "51".8."

Page 30, line 5, for "17"" read "11"."

Page 32, line 6, for "55" read "5.5."

Page 32, line 21, for "of Point" read "off Point."

Page 32, line 8 from bottom, for "undergo is" read "undergoes."

Page 32, line 5 from bottom, for "presents" read "present."

Page 34, line 11 from bottom, for "10".0" read "03".7."

Page 35, line 23, for "56".9" read "50".5."

Page 36, line 8, for "37".4" read "31".0."

Page 36, line 2 from bottom, after "southward" insert "of Point Lobos."

Page 36, line 1 from bottom, for "Point Lobos" read "it."

Page 37, line 12, for "intimated" read "ascertained."

Page 40, line 18, for "straight" read "strait."

Page 49, line 15 from bottom, for "moon" read "noon."

Page 56, line 14, for "$12,000,0000" read "$12,000,000."

Page 58, line 8, for "are formed" read "is found."

Page 60, line 7, for "37 59 39.4" read "37° 59′ 39".4."

Page 60, line 2 from bottom, for "levated" read "elevated."

Page 61, line 21 from bottom, for "31.6"" read "31".6;" for "54.9"" read "54".9."

Page 61, line 11 from bottom, for "islet" read "islets."

Page 62, line 4, for "4½" read "3½."

Page 62, line 19, for "four" read "three."

Page 77, line 16 from bottom, for "Oregon," read "Oregan."

Page 88, line 8 from bottom, for "127° 58′" read "123° 58′."

Page 92, line 12, for "after" read "before."

Page 93, line 10, for "311-315"" read "41-48."

Page 95, line 19, for "channel one," read "channel, one —."

Page 96, line 2, for "norhernmost" read "northernmost."

Page 97, between lines 21 and 22, insert—

The two bars bore from each other SE. by E and NW. by W., and their distance apart was 2¼ miles, with the seaward extremity of the Middle Bank in line between them.

The Middle Bank between the north and south channel was about a mile wide, and regular up to the cape, except the off shoot to connect with Sandy island, which bore E. by S. ½ S. 3⅓ miles from Disappointment, and NW. ¾ N., two miles from Adams. N.NE. from it the Chinook shoal stretched southward within less than a mile.

The western tail of the great Middle Shoal, eastward of Point Adams, lay NE. ¾ N. 1¾ mile from that point.

The channels north and south of this bank had changed very much, but to them we shall not again refer.

We note the following changes since the survey of 1841:

That the south sands, then stretching 6 miles westward from Point Adams, had been cut through at a point half their distance out by a wide channel, with deep water, running S. by W. from Sandy island, but the bar of this channel was not yet fairly cut through, having less than 3 fathoms upon it. This channel was therefore running at right angles to the one of 1841, and over the very spot marked bare in 1839.

That the north channel retained the same general features, but had moved to the southward; its southern part cutting away over a mile of the west end of the south sands of 1841. It still had over a fathom more water than the south channel. Inside of Cape Disappointment it retained the same general direction as in 1839 and 1841, but was more contracted.

That the Middle Bank was much changed, but its northern portion similar to that of the two previous surveys. The eastern point had moved N.NW. three-quarters of a mile since 1841. Sandy island had much increased in size, and apparently moved with it.

That a long sand bank had made out over a mile NW. from Point Adams, and was called the Clatsop spit.

That the western tail of the great Middle Shoal, eastward of Point Adams, had been cut away three-quarters of a mile.

SURVEY OF 1852.

This was the second examination by the United States Coast Survey, founded upon a complete triangulation and the topography of Point Adams, Sandy island, and Cape Disappointment.

Two channels remained as in 1850. The south had become more defined, having 3½ fathoms across the bar, which was three-quarters of a mile wide, and the general direction of the channel N. ½ W. From Point Adams it bore SW. ¾ S., distant 3¼ miles, and from Cape Disappointment S.SE., 5¾ miles It was 2½ miles distant from the beach south of Point Adams.

The north channel was S. ½ W., 3 miles from the cape, and W. ⅓ S., 4½ miles from Point Adams; it had 4½ fathoms upon it toward the southern side, and its width was three-quarters of a mile. The midchannel course for 1½ mile was NE. by N., then N. by W. towards the cape, turning to the east half a mile before reaching it, and after a mile on this course running E.SE. past the north side of Sandy island; or, continuing past the cape within a quarter of a mile, then steering E.NE. one mile, in from 8 to 5 fathoms, changing to SE. by E. through a 3-fathom channel, past the NE. side of Sandy island. The old Spit bank of 1792 had made out half a mile nearer the cape than then existing, but having a 3-fathom channel across it.

Page 97, line 29, for "bank" read "shoal."
Page 97, line 9 from bottom, for "bank" read "shoal."
Page 98, line 6, for "is" read "are."
Page 98, line 11, for "bank" read "shoal."
Page 100, line 18, for "Columbia" read "Columbia's."
Page 103, line 22 from bottom, add "from the south bar."
Page 104, line 12, for "which" read "it."
Page 109, line 14, for "377" read "110."
Page 109, line 18 from bottom, for "is" read "are."
Page 112, line 4 from bottom, insert "110" in the blank.
Page 116, line 4 from bottom, for "ow" read "low;" for "findl" read "find."
Page 120, line 2, for "refitted their ships here" read "were refitted here."
Page 120, line 30, for "and ———" read "136-148."
Page 122, line 4 from bottom, "for good withholding" read "with good holding."
Page 125, line 3, for "northwest" read "northeast."
Page 129, line 17 from bottom, delete "first"
Page 132, line 16, in blank space insert "distant."
Page 135, line 8 from bottom, for "Cordowa" read "Cordova."
Page 137, line 18 from bottom, for "sweeps" read "sweep."
Page 141, line 24, for "the shore" read "the eastern shore."

APPENDIX No. 39. (Sept. 1862)

DIRECTORY FOR THE PACIFIC COAST OF THE UNITED STATES, REPORTED TO THE SUPERINTENDENT OF THE UNITED STATES COAST SURVEY.—BY GEORGE DAVIDSON, ASSISTANT.

INTRODUCTION.

The directory furnished by Assistant Davidson, and first published in the Coast Survey Report for 1858, is now in its revised form, preceded by a brief sketch of the commencement and progress of the survey of the western coast.

California was ceded to the United States by the treaty which was ratified with Mexico on the 30th of May, 1848. In that same year the march of improvement, having already gained the shores of Oregon, prompted applications to the Treasury Department that the Coast Survey organization, which had been working several years on the Atlantic side, might be made to include also the Pacific coast. In accordance with directions from the department, the Superintendent of the Coast Survey, in the autumn of 1848, organized a surveying party, assigning for the field work, in Oregon, James S. Williams, one of the most experienced of the civil assistants in reconnaissance, and, for the hydrography, Lieut. Com'g W. P. McArthur, U. S. N., of tried service in the survey of the Atlantic sections. Sub-Assistant Jos. S. Ruth was detailed as topographer. For the general uses of the party, the schooner Ewing was despatched from New York on the 10th of January, 1849, under command of Lieut. W. A. Bartlett, U. S. N., and the party followed on the 1st of February in the steamer Falcon, by way of the Isthmus of Darien. The Ewing, after a long and dangerous passage, passed the straits of Magellan, and finally reached San Francisco on the 1st of August, her time from Callao being fifty-one days. The opening of gold deposits near San Francisco had, months before, concentrated all the means of coastwise transport there, leaving Mr. Williams unable to reach the mouth of the Columbia river. He occupied the time, after his arrival in April, by a general reconnaissance of the north shores of San Francisco bay. Lieut. Com'g McArthur joined the party in the Ewing, at the end of August, to find that the retention of any part of her crew, while gold was to be picked up, would be a matter of extreme difficulty. The high rate of wages, moreover, and the lateness of the season, made it expedient to defer special operations till the next year. Notwithstanding the drawbacks alluded to, a general reconnaissance of the coast was made by this party from Monterey northward to the mouth of the Columbia river, and a preliminary survey of the entrance of that river. With full knowledge of the difficulties to be overcome in pushing the desired work further, four of the younger officers, who had been engaged on the Atlantic coast—George Davidson, A. M. Harrison, James S. Lawson, and John Rockwell—pledged the assurance of their exertions, and were sent out in May, 1850. These were followed in October by Assistant R. D. Cutts and by A. F. Rodgers, the result of whose labors has been the elaborate topographical survey of the shores of San Francisco bay, and of the coast northward to Bodega bay. The party first detailed for duty left the Pacific coast in the following autumn, having added the survey of Mare Island strait, and a large amount of general information relating to the coast, its harbors, and river entrances, and to the islands. Lieut. Com'g McArthur and Lieut. Bartlett had given special attention to the lighting and marks needed for safer navigation, and furnished the sailing directions then requisite for passing up the coast and through the straits of Fuca.

Assistant Davidson, of the party, which, in 1850, so fully met my expectations, determined the geographical position of Point Conception, a service of the first consequence at that time for the rapidly increasing transit by sailing vessels along the coast of California. To this succeeded the determination of geographical positions, and of the magnetic variations at prominent points and headlands, and the topographical survey of various localities in California and Oregon, by the untiring energy of Mr. Davidson and the assistants who took up work during the same season. Their names are associated with most of the maps and charts of the western coast, which have since been published, and with descriptions of the field work in the annual reports of the Superintendent.

The survey of the shores of the Santa Barbara channel was further extended by the detail for duty of Captain (now Brigadier General) E. O. C. Ord, U. S. A., and Sub-Assistant W. M. Johnson, in the summer of 1853, and by Assistant W. E. Greenwell, since February, 1855. Assistant G. A. Fairfield, in the same season, replaced Mr. Cutts in the triangulation which he had carried from Monterey to the north of San Francisco, and was in turn succeeded by Assistant Davidson, who had, in the interval, developed the geographical peculiarities of Washington Territory by the triangulation of Admiralty inlet, Puget's sound, and the numerous indentations of both, and by determinations of latitude, longitude, and the magnetic elements, at many points of the shores of the Territory, as he had previously done on the shores of California and Oregon. At his return to the Atlantic coast, in December, 1860, the continuance of the work in Washington Territory devolved on Sub-assistant Lawson.

Commander James Alden, U. S. N., took charge of the hydrographic operations in August, 1851; revised the early reconnaissance of the entire western coast of the United States, and in the course of the nine years following brought the local hydrography up even with the data which had been supplied by the field parties. Working part of the time with two vessels, he was assisted in the command at intervals by Lieuts. Com'g Thos. H. Stevens, J. S. Kennard, R. M. Cuyler, and Arch'd MacRae. As chief of the hydrographic party, the name of Commander Alden is connected with nearly all the charts which are referred to in the directory of the Pacific coast. For the tides, to which special attention has been given from an early period in the history of the survey, as to one of its most important adjuncts, the requisite observations, at points selected by the Superintendent, were first directed by Lieut. W. P. Trowbridge, and, for a short period after, by Lieut. N. F. Alexander; but since July, 1857, by Lieut. G. H. Elliot, severally of the Corps of Engineers. The results worked out in the office for the tides, and for latitude and longitude, the sailing directions furnished by the hydrographic officers for the charts, the distances between points as measured on them, the dangers of the coast, and additional particulars within the personal knowledge or observation of Assistant Davidson, will be found embodied in his directory.

A list of the special surveys made on the western coast is given in Appendix No. 38.

A. D. BACHE, *Sup't U. S. Coast Survey.*

GERMANTOWN, PA., *December* 1, 1862.

DEAR SIR: In my answer to your letter of inquiry of November 10, it was stated that since writing the directory I had accumulated much valuable material.

This having been incorporated, it is proper to mention that the principal sources of information were the reports of the progress of the Coast Survey in Santa Barbara channel and Monterey bay; your discussion of the mass of tidal observations; the establishment of new light-houses and changes in old ones; the work upon the approaches to San Francisco bay; the detailed survey of Crescent City harbor; the examinations of the approaches, entrances, and extent of Koos and Gray's bays; the continuation of the work in the Gulf of Georgia; and two years' additional personal experience. In that time I made special examinations of the seaboard, from Half-moon bay to the Walalla river, embracing the first accurate determination of the position and extent of the middle and north Farallones.

It will, perhaps, be gratifying to you to learn that, beyond the typographical errors in the first publication, it has not been found necessary to expunge a dozen lines, and that the few changes made have resulted from giving details where investigation had solved generalities.

Many portions have been rearranged to bring each item consecutively before the eye.

Very respectfully, yours,

GEORGE DAVIDSON, *Ass't U. S. Coast Survey.*

Prof. A. D. BACHE,
Superintendent U. S. Coast Survey, Washington, D. C.

KENSINGTON, PA., *August* 29, 1858.

DEAR SIR: In offering for your acceptance the following Directory for the Pacific Coast of the United States, it may not be amiss to state the circumstances under which it was undertaken.

For nearly eight years the duties which you assigned to me in California, and in Oregon and Washington Territories, kept me moving continually along the seaboard in every manner of conveyance, and familiarized me with almost every mile of the coast, along which my various trips and explorations have amounted to an aggregate of between fifty and sixty thousand miles. I early felt the want of reliable information in tangible form, instead of trusting to memory, and, upon assuming the charge of the coast surveying brig R. H. Fauntleroy, I determined to embody for publication the information acquired, but several years of failing health prevented the execution of more than regular duties, until the growing desire to leave the Pacific coast forced me to occupy the remaining leisure moments in arranging the matter while yet freshly photographed upon the mind. A small part was published in San Francisco, and although abounding in typographical errors, the avidity with which it was sought was a strong incentive to continue the self-imposed task. The result is now placed at your disposal, and having examined all the courses, distances, and positions, I trust that no essential errors have been overlooked; but whatever have, fall upon my own shoulders.

My duties having been especially geodetic and astronomical, we naturally preceded the hydrography, and, working in comparatively unknown waters, have had constant occasion to use the lead. When seeking for an anchorage, drifting with currents, or on boat duty, I have almost invariably kept it going from my own hand. Several discoveries have rewarded our efforts.

The historical notices of previous discoveries will be found few and short, as hardly coming within the scope of the present undertaking. The descriptions may reconcile some of the discordances of the early navigators.

Very respectfully, yours,

GEORGE DAVIDSON, *Assistant Coast Survey.*

Prof. A. D. BACHE,
Superintendent U. S. Coast Survey, Washington, D. C.

INTRODUCTORY.

Before the recent conquest of California and the discovery and development of its vast mineral wealth, comparatively little was known of the hydrography and geography of its coast, except by the few navigators trading along its seaboard, or the daring otter hunter, familiar with every cove, rock, and headland. All that had been accomplished forcibly showed that a great work had yet to be planned and executed.

It would take us far from our prescribed path to trace the extent, bearing, and importance of the successive discoveries made during a period of more than three hundred years, between 1539, when Francisco de Ulloa first determined Lower California to be a peninsula, and 1853, when the Superintendent of the United States Coast Survey first despatched a party to give definite shape to our shores. If the early adventurers and discoverers made their explorations in small crazy vessels, with wretched and untrustworthy instruments and methods, it is no less true that the first Coast Survey parties made theirs with inadequate funds, and under difficulties and privations that the well-housed Californian of to-day can never fully appreciate.

The task we have proposed to ourselves before leaving this glorious El Dorado, whose Golden Gate has admitted in ten years the commerce of every nation, and given egress to products worth five hundred millions of dollars, will be, to state all that is known at the present time of the hydrography and geography of the Pacific coast of the United States from the southern boundary in 32° 32′ to the northern boundary in 49°, embracing an ocean shore-line of over 3,120 miles, divided as follows: California, including the islands of the Santa Barbara channel, 1,097 miles; Oregon 285 miles; Washington Territory, including the south side of the Strait of Juan de Fuca, Admiralty inlet, Puget's sound, the Archipelago de Haro, &c., 1,738 miles.

The descriptions of ports, bays, anchorages, reefs, capes, islands, &c., will be given generally from personal observation made during an examination of the coast, extending through nearly eight years. Whatever has not come directly under our own criticism will be taken from the published reports and maps of the Coast Survey. The names adopted will be those most reliable. Where any changes have taken place, they will be stated if known.

With these few words of introduction, we may be pardoned in expressing a conviction that the knowledge herein conveyed will be of advantage to our extended commerce, and in assuring the navigator approaching the bold outline of our coast, of the accuracy of the geographical positions. No work of the kind has heretofore been undertaken; and should it possess no other merit than serving as a nucleus for aggregating future discoveries and developments, we shall feel that our labor has not been wholly in vain.

EXPLANATORY REMARKS.

The *longitudes* of nine stations on the coast have been determined by the Coast Survey, by means of moon culminations, occultations, and solar eclipses. The observations of moon culminations at each station generally extended through three lunations. The *latitudes* were determined according to the most approved methods and with the most delicate instruments. These stations and twenty-four intermediate ones have been connected by means of a large number of chronometers, (from fourteen to twenty-one,) transported by steamer, for the determination of the longitudes of the intermediate ones, of which the latitudes were also accurately determined in the same manner as the principal ones. Other points, including light-houses, have been determined by triangulation.

Where any position is given to the nearest minute only, it has been taken from the latest chart of the Coast Survey. The longitude is reckoned west from Greenwich.

The prediction of the tides supersedes the crude approximations of previous explorers.

Tables and examples will be introduced to show the manner of predicting the times and heights of high and low waters at San Francisco and other harbors.

Soundings are given for mean low water.

Bearings are magnetic.

Distances are expressed in geographical (nautical) miles.

Magnetic declinations (variations) were determined with delicate and reliable instruments, and precautions were always taken to avoid the influence of local attraction.

Descriptions of light-houses, fog-bells, buoys, &c., are from the published notices of the Light-house Board.

COAST DIRECTORY, MEXICO.

LOS CORONADOS.

These islands belong to Mexico; lie about seven miles off the coast, and nearly eight miles south of the boundary between Mexico and the United States.

They form a group of high, bold, and abrupt rocks and islets, of which the largest is 15 miles S. 11° E. from Point Loma, about $1\frac{5}{8}$ mile in length by one-third of a mile in breadth, and lying in a NW. and SE. direction. It is a wedge-shaped mass, about 575 feet above the sea, the surface having some earth upon it, but entirely destitute of trees. A few small shrubs exist, and during the rainy season the soil is covered with grass, and a great abundance of gaudily colored wild flowers showing in patches of orange, purple, and yellow, when seen from the water. During the dry season everything is withered and the islet presents a sterile appearance. Cacti and other plants grow among the rocks.

There is an anchorage about one-quarter of a mile to the eastward of the islet, and but one landing place; even there the ascent is difficult for fifty feet, and thence easy to the crest, about half a mile distant.

The geographical position of the highest point, as determined by the Coast Survey, is:

	°	′	″	
Latitude	32	23	46	north.
Longitude	117	13	21	west.
	h.	*m.*	*s.*	
Or, in time	7	48	53.4.	

On the west and northwest sides of the islet, and about half a mile distant, lie two smaller ones, or rather two masses of rocks about 50 feet high, and destitute of vegetation. They are a favorite resort for the enormous sea elephants. Excellent anchorage is said to be found in the vicinity. The smaller of the two prominent islets is about half a mile in length; lies N. 58° W. from the larger, and is distant $2\frac{3}{8}$ miles. It is a huge barren rock, with very sharp summit.

In coming from the south, this group affords a good mark for making San Diego, although before being up with them Point Loma shows distinctly.

Los Coronados were discovered by Juan Rodriguez Cabrillo in 1542, and named by Viscaino in 1602, in honor of Francisco Coronado, governor of the province of Xalisco, under Cortes.

PACIFIC COAST OF THE UNITED STATES.

CALIFORNIA.

The name California is first found in the worthless romance of "Sergus, of Esplandian," the son of Amadis of Gaul, written by Garcia Ordoñez de Montalvo, the translator of the Amadis. It was first printed in 1510, with editions in 1519, 1521, 1525, 1526, (two,) 1575, 1587, and the recent reprint of 1857.

The name appears in numerous passages, of which the following are given.

Sergus, ch. 157. "Know that, on the right hand of the Indies, very near to the Terrestrial Paradise, there is an island called California, which was peopled with black women, without any men among them, because they were accustomed to live after the fashion of Amazons."

"In this island called California are many Griffins, on account of the great savageness of the country and the immense quantity of the wild game found there."

"Now, in the time that those great men of the Pagans sailed [against Constantinople] with those great fleets of which I have told you, there reigned in this land of California a queen, large of body, very beautiful, in the prime of her years," &c., &c.

The name California next occurs in the memoirs of the conquistador, Bernal Diaz del Castillo, who served with Cortes in the conquest of Mexico. He writes that "Cortes again set sail from Santa Cruz and discovered the coast of California." Here Cortes remained for some time, disheartened at the want of success of his various expeditions. The viceroy, Mendoza, despatched a vessel under the command of Ulloa with letters to Cortes. "Ulloa had a most favorable voyage, and soon arrived in the harbor where Cortes lay at

anchor. The letters of his wife and those of his children and of the viceroy had so much effect upon him that he gave the command of his vessel to Ulloa, embarked for Acapulco, and, when he had arrived here, he hastened to Quauhnahuac, where his wife resided. * * * Shortly after, also, the troops arrived which had been left behind in California."

After a few months' repose Cortes sent out a more considerable expedition, under command of Ulloa. "This armament left the harbor de la Natividad in the month of June of one thousand five hundred and thirty, and so many years—I forget the exact year."

The California referred to above is the peninsula of that name, generally known as Lower California, and the date 1535. They are the only times in which Diaz uses the name. (Cap. CC.)

In 1539 Francisco de Ulloa determined Lower California to be a peninsula; this fact appears to have been subsequently forgotten, for it was called Ilas Carolinas, in honor of Charles II of Spain.

The name California was gradually used to designate the region from the Gulf of California to the mythical "Straits of Anian."

The country was called New Albion by Sir Francis Drake in 1579.

In recent times the region north of San Diego was called Alta California.

From the southern boundary, in latitude 32° 32′, longitude 117° 06′, to Point Arguello, in latitude 34° 34′, longitude 120° 38′, the coast runs W.NW. 225 miles; from Point Arguello to Cape Mendocino, in latitude 40° 25′, longitude 124° 22′, NW. 525 miles; from Cape Mendocino to Cape Flattery, in latitude 48° 23′, longitude 124° 44′, N.NW. 480 miles.

The monument marking the western initial point of the boundary between Mexico and the United States is on the table bluff rising from the low land south of San Diego bay. It is an obelisk of white marble, about twenty feet in height, and resting upon a pedestal. It stands near the edge of the bluff, about two hundred yards from the sea-shore, and is plainly visible from the water. Its geographical position, as determined by the Coast Survey, is:

	° ′ ″
Latitude	32 31 58.46 north.
Longitude	117 06 11.12 west.
	h. m. s.
Or, in time	7 48 24.74.

A view of the initial point and surrounding country was published by the Coast Survey on the reconnaissance chart of 1853.

From the boundary the coast is low and flat, running N. by W. for about 7 miles; thence curving gradually westward until it is nearly east and west at the entrance of San Diego bay. The interior of the country is marked by high mountains.

POINT LOMA.

This is the southern part of the western boundary of San Diego bay, and the termination of a remarkable narrow spur of coarse, crumbling sandstone, which rises south of Puerto Falso, or False bay, and west of the town of San Diego, to the height of 300 feet, and after stretching south for about 5½ miles, gradually increasing in height to 422 feet, terminates very abruptly. It is covered with coarse grass, cacti, wild sage, and low bushes.

SAN DIEGO BAY.

Next to that of San Francisco, no harbor on the Pacific coast of the United States approximates in excellence that of the bay of San Diego. It is readily distinguished, easily approached, and a depth of 22 feet can be carried over the bar, which is three-quarters of a mile east of the southern extremity of Point Loma, and between it and the tail of the Zuniga shoal. The bar is about 650 yards across from the outer to the inner five-fathom lines.

Vessels coming from the northwest make the ridge of Point Loma as a long, flat-topped island, when about 25 miles distant. This appearance is occasioned by the bay to the southwest, by the low land to the northeast, and by the Puerto Falso at the north.

A thick field of kelp lies along the western shore of Point Loma, the inner edge being about one mile off-shore, and having a breadth of half a mile. The outer edge marks the line where the depth of water suddenly changes from 20 to 10 fathoms. The field commences off the bar at the entrance to False bay, and stretches southward 2¾ miles south of Point Loma. Approaching the south end of Loma, along the

outer edge of the kelp, pass through a partial break in it, and when the point bears NE. by E., distant 1½ mile, keep along the northern edge of the kelp in 4½ fathoms, and about half a mile from the point.

As soon as the point is passed, a long, low beach of shingle is opened, making out from the east side of the point and forming a natural breakwater, formerly called Punta de Guiranas* by the Spaniards, but now designated as Ballast Point.

Round up gradually until Ballast Point is brought in range with the easternmost house of La Playa, (distant one mile from Ballast Point and on the same side of the bay,) and be careful not to open more of the village, as the shoal called Barros de Zuniga† stretches south from the east side of the entrance, parallel to the ridge of Point Loma, and distant only three-quarters of a mile from it. Between Point Loma and this shoal runs the channel, which is less than half a mile wide within the three-fathom lines. With the least swell the breakers show the position and extent of the shoal, and at low tides part of it is bare. It has been said that a rock, having but five or six feet of water upon it, lies in the channel; its position being marked by a patch of kelp, which is, however, torn away in heavy weather. The pilot-boat Fanny reported being upon it in 1851, but the examinations of the Coast Survey have developed no such danger, and the report has been generally discredited.

During the summer keep as close to Point Loma as the draught of the vessel will permit, and lay on the wind up to Ballast Point, off which four fathoms can be carried within a ship's length, with 10 fathoms in mid-channel, and a very strong current on the ebb and flood tides; the former setting over the Zuniga shoal. After passing Ballast Point steer for La Playa, and anchor anywhere in from 4 to 10 fathoms, with good holding-ground. Inside the point, and about 250 yards N. by W. from it, is a shoal having only 12 feet water upon it, in a line from Ballast Point to the westernmost house at La Playa. It is a quarter of a mile long. The shoals on the starboard hand, after entering, are plainly in sight, except at very high water. The channel, however, is buoyed, and cannot be missed. From La Playa to New San Diego, four miles distant, the channel curves to the right and contracts, but about six fathoms water may be carried that far. A mile or two beyond the town the bay becomes shoal and filled with flats, yet a very narrow three-fathom channel runs close along the eastern shore, nearly to the head of the bay.

Coming from the south, run for the extreme end of Point Loma until Ballast Point and La Playa are in range, as before, and follow the foregoing directions.

When inside the harbor vessels are perfectly safe, but during very heavy southerly weather the kelp is said to drive in such masses as to make vessels drag their anchors. We have never known such a case, and doubt if a vessel with good ground tackle and proper attention would suffer from this cause. Certainly there is not reach enough for the wind to raise a swell, and the holding-ground is excellent. In heavy southeast weather the sea breaks over Ballast Point, and in 1851 the pilot-boat Fanny was piled upon it.

POINT LOMA LIGHT-HOUSE.

This primary sea-coast light is less than half a mile from the southern end, and situated upon the highest part of the point, which here attains an elevation of 422 feet above high water. The building consists of a stone dwelling of one and a half story, with a low tower of plastered brick rising from the centre sufficiently high to place the focal plane of the light 450 feet above the sea. The light is a *fixed white light* of the third order of Fresnel, exhibited (since November 15, 1855,) from sunset to sunrise, illuminates the entire horizon, and in clear weather should be visible—

From a height of 10 feet above the sea, at a distance of 28 miles.
From a height of 20 feet above the sea, at a distance of 29 miles.
From a height of 30 feet above the sea, at a distance of 31 miles.

The geographical position of the light, as given by the Coast Survey, is:

	°	′	″	
Latitude	32	40	13.0	north.
Longitude	117	12	22	west.
	h.	*m.*	*s.*	
Or, in time	7	48	49.5.	

Magnetic variation, 12° 29′ east, in April, 1851, with a yearly increase of 1′.

* Or Punta de los Guijarros.

† Named by Viscaino in 1602. Don Gaspar de Zuniga, Count de Monterey, despatched the expedition.

TIDES AT SAN DIEGO.

General remarks upon the nature of the tides of the Pacific coast will be given further on, under the head of tides at San Francisco. The tables for San Diego will be given at the end of the Directory.

Tables I and II are used for determining the time of high water, and table III will give the times of the other high and the low waters. Tables IV and V give the height of high water, and tables VI and VII the height of the other high and low waters. The explanation of these tables, with an example illustrating their application for San Francisco, will be found on pages .

The corrected establishment or mean interval between the time of the moon's transit and the time of high water at La Playa is IX*h*. XXXVIII*m*. The mean rise and fall of tides is 3.7 feet, of spring tides 5.0 feet, and of neap tides 2.3 feet; the mean duration of the flood is 6*h*. 25*m*.; of the ebb, 6*h*. 0*m*.; and of the stand 0*h*. 30*m*. The average difference between the corrected establishment of the a. m. and p. m. tides of the same day is 1*h*. 20*m*. for high water, and 1*h*. 6*m*. for low water. The differences, when the moon's declination is greatest, are 2*h*. 4*m*. and 1*h*. 36*m*., respectively. The average difference in height of these two tides is 1.5 foot for the high waters and 2.1 feet for the low waters. When the moon's declination is greatest, those differences are 2.2 feet and 3.0 feet, respectively. The average difference of the higher high and lower low waters of the same day is 5.5 feet, and when the moon's declination is greatest, 6.3 feet. The higher high tide in the twenty-four hours occurs about 9*h*. 10*m*. after the moon's upper transit, (southing,) when the moon's declination is north, and about 3*h*. 16*m*. before when south. The lower of the low waters occurs about 7¼ hours after the higher high tide.

The greatest observed difference between two low waters of one day was 4.2 feet, and the greatest difference between the higher high and lower low waters of one day, 8.8 feet.

The existence of a bar at the entrance of this port was discovered by Vancouver in 1793, and in criticising a plan of the harbor, published by Dalrymple in 1782, he remarks: "This plan, in point of correctness, is justly entitled to much praise, but was yet capable, as far as came under my observation, of the following little improvements: the scale representing five nautical miles should only subtend three miles and a half; the shoals of Barros de Zooniga, though well placed, instead of being two distinct shoals ought to have been one entire shoal, stretching something further to the NW. and SE. than is therein represented; and the soundings between Barros de Zooniga and the land of Ponta de la Loma, (which is omitted,) are in no part, from the south extremity of the former directly across to the latter, more than four fathoms at high water, and form a narrow bar from the shore to the shoal, gradually deepening as well on the inside as on the outside of the bar, with a regular increase in mid-channel, from five, close to the shore, to ten fathoms between the two low points that form the entrance to the port."—(Vol. II, page 473.)

As the mean rise and fall of spring tides is five feet, and of neap tides about two and a half, Vancouver's and the recent examinations of the Coast Survey confirm each other, and tend to show that the depth has remained the same for the last sixty-three years.

The primary astronomical station of the Coast Survey is on the round-topped hill, 100 feet high, and a quarter of a mile W.SW. of La Playa.

Its geographical position is:

	°	′	″	
Latitude	32	41	57.6	north.
Longitude	117	13	22	west.
	h.	*m.*	*s.*	
Or, in time	7	48	53.5.	

The eastern side of the entrance to San Diego bay is low and flat, covered with thick bushes and grass. It is called "The Island," although a peninsula, being very low and narrow towards the head of the bay. On Ballast Point, at the base of the Point Loma ridge, are visible the ruins of the old Spanish fortifications, &c.

From Ballast Point the bay runs about north for a mile and a half; thence curves gradually to the eastward for three miles to New San Diego; thence to the head of the bay, southeast, seven miles. The average width of the bay after passing La Playa is a mile and a half, but at New San Diego, after contracting to a trifle over half a mile, it again expands to about a mile and a half, with low shores and extensive marshes and flats. Many years since the San Diego river changed its course during a freshet, and emptied into San Diego bay instead of Puerto Falso to the northwest. The result was a rapid filling in of the bay opposite

the old town of San Diego. An appropriation was made by Congress to turn the channel of the river to its original bed. This was done a few years ago, but the works have not proved of sufficient strength.

The great drawback in San Diego bay is the want of fresh water, which has to be brought from the river. An effort was made in 1851 to obtain a supply at La Playa by sinking an artesian well, but after boring 635 feet the attempt was abandoned. A similar attempt, with like results, was made at New Town, both confirming the previously expressed opinion of geologists. The same amount of money would have brought it in earthen pipes from the river. During the long dry season the river loses itself in the sand, and the inhabitants are compelled to dig in its bed to obtain their supplies. Fresh provisions are readily procured here. Wood is scarce and not good.

The land in the region of San Diego bay is, with the exception of a small portion, well adapted to grazing. There are numerous tracts, of limited extent, which produce well, but they are favorably situated for irrigation, the want of rain being very much felt in every section. Back in the mountainous districts is found abundance of timber of many varieties, such as oak, pine, cedar, fir, ash, sycamore, elm, &c. Gold, silver, lead, copper, &c., are found, but the product is not remunerative. A vein of coal (lignite) has been discovered near San Diego, is reported of excellent quality, and interested parties are erecting machinery to work the lead, but the experiment must prove a failure, because no genuine coal is to be found upon the coast, and in 1851 a report was made against this very deposit.

When fishery assumes a practical shape on this coast the harbor of San Diego will become a position of importance. Already several small companies are engaged in the whaling business. The waters in this vicinity abound with the "California Greys," which are very troublesome to deal with, unless the bomb-lance is used in killing them.

Communication with San Francisco and the northern or windward ports is maintained every week by steamer, and by regular lines of sailing vessels.

San Diego bay was discovered by Juan Rodriguez Cabrillo, a Portuguese in the service of Spain, in September, 1542; called Port San Miguel, and placed by him in latitude 34° 20′ N., showing the imperfection of the instruments and the modes of observing in those days. He found great numbers of Indians here, who received him hospitably, but with cautiousness. It received its present name from Sebastian Vizcaino, who surveyed it in November, 1602.

In his time there existed a forest of tall, straight oak and other trees bordering the NW. side of the bay. This forest was said to be three leagues in length and half a league in breadth, and that to the northwest of it was a good harbor, now known as Puerto Falso.

La Perouse (in 1787) gives a copy of an English map of San Diego, of 1782, (Dalrymple's,) on which no name is assigned to the Zuniga shoal, but the shoal inside Ballast Point and under the eastern shore is called "Shoal of Zuniga." Ballast Point is called "Point Guisarros," and Point Loma, "Hill Point."

At the north end of the ridge of Point Loma is an extensive shoal bay called *Puerto Falso*, or *False Bay*. The bar at its entrance lies N. by W. ½ W., distant 5½ miles from the southern extremity of Point Loma; and having but three feet of water, it can be crossed only in the smoothest weather. The entrance just inside the line of heavy breakers is about a quarter of a mile in width, but rapidly contracts to less than an eighth. The northern point of this bay is about two miles in length, very narrow, and covered with low sand dunes.

A view of False bay and the surrounding country was given on the Coast Survey reconnaissance chart of 1853.

To the north and west of this the shore becomes compact and unbroken, except by the valleys of San Luis Rey and San Juan Capistrano. The waters off this stretch of the coast Vizcaino called the bay of Santa Catalina.

The latest chart of San Diego bay is that accompanying the Report of the Superintendent of the Coast Survey for 1857.

From the southern extremity of Point Loma the coast runs N. by W. for 22 miles; thence to Point Lausen, (of Vancouver, 1793,) forming the east point of San Pedro bay, NW. by W. ½ W. nearly 60 miles.

SAN LUIS REY.

The mission of San Luis Rey is the largest in California, and the number of domesticated Indians formerly in its neighborhood gave it the appearance of a large and thriving settlement.

It was founded June 13, 1798, stands in a rich valley from one to two miles wide, and is about three miles from the ocean, being separated therefrom by a range of hills.

It is nearly in the centre of a section of country unequalled for salubrity and productiveness, but the scarcity of rain is an insuperable drawback.

The mission is now a military post, but very few men are stationed there.

The anchorage is very much restricted and unprotected, and now never visited. Its position on the coast will be seen by reference to the reconnaissance sheet of the Coast Survey published in 1853.

Its approximate geographical position is:

	° ′
Latitude	33 17 north.
Longitude	117 29 west.

SAN JUAN CAPISTRANO.

Now a place of no importance, with an unprotected anchorage, rocky bottom, and bad landing.

This mission, like all the others, is rapidly going to decay.

The approximate geographical position of the anchorage is:

	° ′
Latitude	33 27 north.
Longitude	117 43 west.

The site of the mission is marked on the reconnaissance sheet of 1853.

In latitude 33° 30½′ N., about four miles northwestward along the coast from the western point of Capistrano anchorage, the line of *equal magnetic declination* of 13° east cuts the shore, and passes over the great transverse break of the island of Santa Catalina. This line annually moves southward a mile and a half.

SAN PEDRO BAY.

This bay is well protected in every direction, except against the winter gales from the southeast round to the southwest. During the spring, summer, and autumn, it is an excellent roadstead. From Point Fermin,* which is the southeast point of high land west of the bay, the line of bluff runs exactly north and south for about two miles, being bold, and averaging 60 feet in height.

Vessels coming from the westward through the Santa Barbara channel make San Pedro hill, (1,600 feet in height,) forming the west side of the bay, as an island projected against the mountains to the southward and eastward. Approaching Point Vincente, which is the southwest point of the hill, vessels can keep it close aboard, there being from 50 to 80 fathoms within a mile of the shore; round Point Fermin within half a mile, in from 6 to 10 fathoms, and open the small island called El Moro,† run for that island, and when abreast of the landing, (readily recognized by the houses on the bluff,) about one mile north of Point Fermin, anchor in three fathoms, hard bottom, and half a mile off shore. Vessels must anchor a mile off to get five fathoms.

Coming from the south with northwest winds, beat in boldly until abreast of the landing; keep the lead going and anchor anywhere in its vicinity. Do not approach the low shore, to the north and east of El Moro, closer than one mile, at which limit four fathoms water will be found.

In winter, anchor further out, and more to the southward, in order to be able to slip the cable and go to sea should a heavy southeaster spring up. In 1852 we saw a vessel ride out a very heavy southeast gale of three days' duration. In March, 1863, the steamer Senator was lost in entering San Pedro in a fog.

The waters of the lagoon, inside of the low sandy beach, and a mile or more northward of El Moro, find their principal outlet between that island and the bluff point half a mile west of it. The entrance is very narrow and crooked, and has two buoys, about 200 yards apart, to mark it. In 1859 it is stated‡ that the "bar at the entrance to the creek remains about the same, (as it did in 1852.) At mean low water, throwing out the half tides, only two feet of water can be carried over it." A small tow-boat is now used for taking vessels to New San Pedro, situated about three miles inside the bar.

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* Named by Vancouver in 1792, after the Father, Fermin de la Suen, President of the Missions of Alta California. He applied the name to the west point.

† For El Morro. On the Coast Survey reconnaissance chart of 1852 it is called Dead Man's island.

‡ Report of the Superintendent of the Coast Survey for 1859, page 100.

Wood and water are not readily obtained, and charges are high. The beef raised here is remarkably tough.

The geographical position of the Coast Survey astronomical station on the bluff at the landing is:

	° ′ ″
Latitude	33 43 19.6 north.
Longitude	118 16 03.0 west.
	h. m. s.
Or, in time	7 53 04.2.

Magnetic variation, 13° 30′ east, in November, 1853, with a yearly increase of 1′.

An appropriation has been made for a *light-house on Point Fermin*, and the necessary topographical survey completed. The site recommended to the Light-house Board, by the Superintendent of the Coast Survey, is S. 15° W., and fifteen-sixteenths of a mile distant from the astronomical station.

Tides.—The corrected establishment or mean interval between the time of the moon's transit and the time of high water is IX*h*. XXXIX*m*. The mean rise and fall of tides is 3.7 feet, of spring tides 4.7 feet, and of neap tides 2.2 feet. The mean duration of the flood is 6*h*. 18*m*., of the ebb 6*h*. 5*m*., and of the stand 0*h*. 30*m*. The average difference between the corrected establishments of the a. m. and p. m. tides of the same day is 1*h*. 10*m*. for high water, and 1*h*. 4*m*. for low water. The differences, when the moon's declination is greatest, are 1*h*. 55*m*. and 1*h*. 38*m*., respectively. The average difference in height of these two tides is 1.5 feet for the high waters and 2.0 for the low waters. When the moon's declination is greatest, those differences are 2.3 feet and 3.1 feet, respectively. The average difference of the higher high and lower low waters of the same day is 5.6 feet, and when the moon's declination is greatest 6.6 feet. The higher high tide in the twenty-four hours occurs about 9*h*. 10*m*. after the moon's upper transit (southing) when the moon's declination is north, and about 3*h*. 16*m*. before when south. The lower of the low waters occurs about seven hours after the higher high tide.

The greatest observed difference between the two low waters of one day was 3.9 feet, and the greatest difference between the higher high and lower low waters of one day 8.4 feet.

To find the times and heights of high and low waters, compute them for San Diego, the times and heights being sensibly the same for both places.

The town of Los Angeles is 22 miles north by the road, from San Pedro, and is the centre of an extensive grazing, agricultural, and grape-growing country.

The quantity of grapes, and fruit generally, shipped to San Francisco during the proper season is already enormous, being not less than 2,000,000 pounds. At all seasons one steamer finds a profitable trade. The coasting trade of this place is now greater than the aggregate trade of all the other ports south of San Francisco. In nine months of 1856–'57 the number of vessels entering the port was 82, with an aggregate tonnage of 26,971 tons. Regular communication is maintained with San Francisco and other ports by steamers and sailing vessels.

Over 100,000 gallons of wine, and 5,000 gallons of brandy, were produced in 1854, and the culture of the grape bids fair to outstrip all others. The quantity of wine produced from the vintage of 1857 was 350,000 gallons; of brandies 5,000 gallons. There is no doubt that in 1862 the yield is more than double these quantities.

Cotton, sugar cane, tobacco, flax, and the cereals, yield productive crops, and the olive grows in abundance.

Salt works have been established within a few miles of Los Angeles, but the pond from which the salt water is obtained covers only an area of 600 yards in length by 200 in width. The yearly product is about five tons.

The country at the foot of the back hills is as productive as any in California, but its distance from a large market is a great hindrance to investment and improvement. The vast plains are literally covered with cattle, and many of the rancheros count their yearly increase by thousands. These cattle are driven to the mining districts and San Francisco, but during the not unusual droughts of summer great suffering is experienced, and large numbers of them perish.

The Bay of San Pedro was discovered by Cabrillo in 1542, and was called the Bay of Smoke, (Fumos.)

When Vancouver was seeking for San Pedro bay he found such deep water off Point Vincente that he thought this could not be near the place; but after getting to the south and east he had a full view of the anchorage. He did not, however, enter it.

A view of San Pedro bay and San Pedro hill was given on the Coast Survey sheet of 1853.

In 1861 a preliminary examination was made of the lagoon, situated E. ¼ S., about 15 or 16 miles from San Pedro, and which receives the waters of the Santa Anna river. It was found to be some five miles long, and separated from the ocean by a narrow strip of low sand beach, over which washes the heavy swell from the northwest and southeast storms. The lagoon has a breadth of only a few hundred yards, and a mouth about 50 yards in width, with a narrow bar, upon which it is supposed 10 or 12 feet of water might be found at high tide. On this bar there is a very heavy break at all stages of the tide, rendering it dangerous to cross in boats of any kind. There is said to be no safe anchorage off the entrance, and the low straight beach, with a trend nearly east and west, affords no protection whatever. The San Pedro wind gap lies between San Pedro hill and the Sierra San Juan, to the southeast of the Santa Anna, and the summer winds draw directly on the land, causing the northwest swell to roll upon the beach with great force. In winter the southeast and southwest swell breaks square upon this whole line of coast, and would prevent any vessel passing into or out of the lagoon, or riding at anchor near it.

In summer the Santa Anna is said to frequently dry up before reaching the lagoon.

*From Point Vincente** the coast trends N. by W. ¾ W. for 17 miles; thence W. by S. to Point Dume, in latitude 34° 00′ north, and longitude 118° 41′ west; thence to Point Mugu, W. ½ N. for 17 miles. The last point lies NE. by E. ⅓ E., distant 14 miles from the eastern end of Anacapa. This long curve in the coast is known as the Bahia Ona.

*Point Dume** rises into a dome-like form 202 feet high. The land immediately behind it falls away, so that in making it from the west it rises into view as an island close under the high mountains. Eastward of Dume the mountains spring directly from the water.

A view of Point Dume is given on the Coast Survey sheet of 1853.

From Point Mugu to San Buenaventura, distant 17 miles, the coast has a general trend NW. by W.; but, about midway, it curves southwestward of this course 2½ miles towards Anacapa, thus contracting the eastern entrance to the Santa Barbara channel. Two miles west of Point Mugu is Laguna Point, close under which is very deep water, the 10-fathom line running within 250 yards of the shore. Between Mugu and Buenaventura the coast is low, flat, and sandy, being the opening of the valley of Santa Clara, through which flows the Santa Clara river. This stream is nearly dry during the summer, and terminates in lagoons and marshes, but in the rainy season a volume of water is brought down having sufficient force to break through the narrow sand beach and flow into the ocean. The configuration of the shore, and its relation to Anacapa and Santa Cruz island, are shown upon the preliminary chart of the eastern entrance to the Santa Barbara channel, published by the Coast Survey in 1857.

The eastern entrance to the Santa Barbara channel lies between the eastern end of Anacapa island and Point Hueneme, which is about halfway between Mugu and Buenaventura. From Anacapa, Point Hueneme bears NE. by N. ⅓ N., distant 9¼ miles. Directly off this point is found a remarkable example of a submarine valley, commencing with a depth of 10 fathoms, 400 yards from the beach, increasing to 50 fathoms in five-eighths of a mile, and to 113 in less than two miles. Its general direction is south, with a width of a mile, and bounded on either side by depths of 12 and 15 fathoms. The best landing is directly on the point. Landing in the bight to the eastward and leeward is impracticable.

The erection of a *primary sea-coast light* at this point was recommended by the Superintendent of the Coast Survey, and has been authorized by Congress.

The approximate geographical position of the site is:

	° ′
Latitude	34 08 north.
Longitude	119 09 west.

The computed magnetic variation, August, 1857, was 13° 38′, with a present yearly increase of 1′.

Vancouver says this was called Point Conversion on old Spanish maps; he placed it in latitude 34° 09′, and retained the name.

There is excellent holding ground off Buenaventura in 10 fathoms, but the landing is not good. The three-fathom line lies about a quarter of a mile off-shore.

The Mission of Buenaventura, situated at the foot of the dividing ridge of the valleys of San Buenaventura and Santa Clara, about a half a mile from the shore, was founded March 31, 1782. Its approximate geographical position is:

* Named by Vancouver, 1793.

	° ′
Latitude	34 15 north.
Longitude	119 15 west.

Fifteen miles westward of Buenaventura, on the coast, there is a rich deposit of sulphur, surface specimens of which have yielded 60 per cent. Around the locality are found ashes and scoria. The ground is hot, and the gas emitted is almost suffocating.

SANTA BARBARA.

From San Buenaventura to Santa Barbara the distance is 23 miles, and the bearing nearly W. by N.

Santa Barbara is an open roadstead for all, except northerly winds, which are unfrequent. On the west side of the long, low, sandy beach is a bold bluff, called *Point Felipe.** The hill rising behind it is called La Vigia.

The landing is on the beach about half a mile east of Point Felipe; the shore is very low and flat as far as the town, three-quarters of a mile distant, but gradually rises to the mission, which is a prominent object about two miles inland.

Vessels coming from the westward first sight La Vigia, and, upon approaching the anchorage, keep outside of the line of kelp, (here nearly half a mile wide:) gradually round the point upon which is situated the *light-house*, two miles southwesterly of the landing, keep along the kelp until abreast of the town and anchor in seven fathoms; or pass through the kelp and anchor on the inside in 3½ fathoms, hard bottom. In anchoring far enough off to get 9 or 10 fathoms the bottom will be found sticky. A hydrographic sketch of the vicinity was published by the Coast Survey in 1855. A view of the town and mountains accompanies the sheet of 1853.

No dangers have been discovered in the kelp off this beach.

With the least swell the surf on the beach is a bad one, not falling square on, but cutting it at a sharp angle.

In winter, vessels must anchor outside of the kelp, as the gales detach and drive it shoreward in such vast quantities that, coming across a vessel's hawse, it helps to bring home her anchors.

In January, 1863, the Pride of the Sea was wrecked on the rocks under the light-house at this place.

LIGHT-HOUSE AT SANTA BARBARA.

The structure consists of a plastered dwelling of one and a half story, with a low grey tower, also plastered, rising through the roof. The illuminating apparatus is of the fourth order of the system of Fresnel, and shows a *fixed white light*, illuminating the seaward half of the horizon. It is situated at an elevation of 180 feet above the sea, two miles southwestwardly from the landing on the beach, and 183 yards from the edge of the bluff. The light, as seen from the sea, will be projected against the hill rising behind it.

In clear weather it can be seen from a height of 10 feet at a distance of 19 miles; from a height of 20 feet at a distance of 20½ miles.

It was first exhibited December 1, 1856, as a red light, but has since been changed.

The geographical position, as given by the Coast Survey, is:

	° ′ ″
Latitude	34 23 35 north.
Longitude	119 42 05 west.
	h. m s
Or, in time	7 58 48.3

Magnetic variation, 13° 30′ east in November, 1853; yearly increase 1′.

The secondary astronomical station of the Coast Survey was on the slight grassy rise just in from the beach, and 60 yards from the west side of the road leading to the town. Its position is:

	° ′ ″
Latitude	34 24 24.7 north.
Longitude	119 40 18.0 west.
	h. m. s.
Or, in time	7 58 41.2.

* Named by Vancouver, 1793; called Point Castillo on the Coast Survey chart of 1853, from a small Mexican battery formerly existing upon it.

Santa Barbara is a town of considerable size, lying in the middle of an agricultural tract, running east and west, at the southern base of the Sierra Concepcion, but of limited breadth. The trade with San Francisco is not extensive; but this being one of the greatest stock-raising districts on the coast, vast droves of cattle pass through and are sent to San Francisco and the mining districts.

The mission, founded December 4, 1786, is one of the largest and best establishments of the kind in California, and in the gardens attached to it the grape and olive were cultivated with success. In the town of Santa Barbara there is a single grapevine which yielded during the year 1858 over two thousand pounds of grapes. A single stem rises from the ground a height of five feet, and its branches, supported by poles, cover a very large area. At the base the trunk measures two feet in circumference.—(California State Register, 1859.)

A large bitumen pit, about eight miles west of Santa Barbara, empties directly into the ocean, and the bitumen, floating on the water, works *against* the summer of northwest winds even beyond Point Concepcion. Very frequently, in calm weather, a great extent of the surface of the channel becomes iridescent from the thin film of bitumen spread over it. The rocks along the shore, even to the westward of Point Concepcion, are covered with it, and when encamped at El Coxo, in 1850, we gathered it to start our fires. The Indians have always used it to pay the seams of their canoes.

Sulphur, in large beds and of superior quality, exists along the seaboard, and manifests itself in all the warm springs.

Wood and provisions in abundance can be easily obtained here. Water is plenty, but not so readily procured.

A very short distance back from the coast line is a range of rugged hills, over 2,000 feet high, forming part of the Sierra Concepcion, (sometimes called the Sierra San Inez,) whose sides are sparsely covered with timber, and through some of whose gullies and gorges pass small streams abounding in the finest trout. From others issue warm springs having a temperature of about 117° Fahrenheit, and highly impregnated with sulphuretted hydrogen. The height of the springs by barometric measurement is about 1,200 feet. They lie behind the village of Montecito, eastward of Santa Barbara.

The coast trail to San Francisco passes along the shore for a distance of 15 or 20 miles to the Gaviota pass; thence inland to the Santa Inez valley, which runs nearly parallel with the coast.

Regular communication by steamers and sailing vessels is maintained with San Francisco and other ports.

In 1542 Cabrillo visited this place and found great numbers of Indians, who came off to his ships in large canoes, and were quite hospitable. Close to shore he found an Indian town with "*casas grandes.*" To it he gave the name Pueblo de los Canóas.

The coast line from Santa Barbara light to Point Concepcion light runs W. by S., distance 37 miles. The rugged hills westward of the Gaviota pass come close to the shore, forcing the traveller to leave the beach for their sea slope, the trail passing over steep ridges and down valleys.

The simoom.—The only instance of the simoom on this coast, mentioned either in its history or traditions, was that occurring at Santa Barbara, on Friday, the 17th of June, 1859. The temperature during the morning was between 75° and 80°, and gradually and regularly increased until about one o'clock p. m., when a blast of hot air from the northwest swept suddenly over the town and struck the inhabitants with terror. It was quickly followed by others. At two o'clock the thermometer exposed to the air rose to 133°, and continued not lower than that point for nearly three hours, whilst the burning wind raised dense clouds of impalpable dust. No human being could withstand the heat. All betook themselves to their dwellings and carefully closed every door and window. The thick *adobe* walls would have required days to have become warmed, and were consequently an admirable protection. Calves, rabbits, birds, &c., were killed; trees were blighted; fruit was blasted and fell to the ground, burned only on one side; and gardens were ruined. At five o'clock the thermometer fell to 122°, and at seven it stood at 77°. A fisherman, in the channel in an open boat, came back with his arms badly blistered.

It is recorded that on the 23d of June there was a remarkable hot day over Stanislaus county. The thermometer stood at 113° in the shade, and the wind actually burned as from a hot oven. Birds dropped dead from the trees.

At the entrance of the valley of El Coxo, near Point Concepcion, whilst engaged in making astronomical observations, during July, August, and September, 1850, we frequently experienced at night hot blasts coming

down from the Sierra Concepcion, after two or three days of clear, calm, hot weather; the north winds apparently bringing the heated air from the valleys behind the sierra. The records show many cases where stars suddenly became so very diffused, large, and unsteady by these short hot blasts as to be unfit for observation. Beyond the annoyance and delay occasioned by this circumstance no observations were made to determine the temperature of the heated air. It had, of course, not near so elevated a temperature as that sweeping over Santa Barbara, and was quite fitful.

POINT CONCEPCION.

This characteristic and remarkable headland, about 220 feet in height, lies at the western entrance to the Santa Barbara channel. Once seen, it will never be forgotten. When made from the northward, or from the eastward, it rises as an island, but, upon approach, is found to be a high promontory, stretching boldly into the ocean, and terminating abruptly. The land behind it sinks comparatively low, and at first gradually, but soon rapidly rises to the mountains, which attain an elevation of about 2,500 feet. Between three and four hundred yards south of the face of the cape is a large rock nearly awash, upon which some of the California steamers have struck in very foggy weather. A topographical sketch of the point accompanies the Superintendent's report on the Coast Survey for 1851. Views of it accompany the sheet of 1853.

LIGHT-HOUSE AT POINT CONCEPCION.

The buildings are erected on the extremity of the cape and upon the highest part, which is 220 feet above the sea, and covered with grass and bushes like the land behind. As seen from the southward by day it will be projected against the Sierra de la Concepcion, and appear about one-third of their height from the water. The part of the range behind the light-house seems very level along its summit, and the house is seen about one-third of the length of the level range from the western part of it. The structure consists of a brick dwelling, plastered, of one and a half story, with a low tower, also of brick, and plastered white, rising from the centre. The light was first exhibited February 1, 1856, and shows from sunset to sunrise. It is a primary sea-coast light, consisting of an illuminating apparatus of the first order of the system of Fresnel, and exhibits a *revolving white light, showing a flash every half minute*, throughout the entire sea horizon. It is elevated about 250 feet above the sea, and should be visible, in a favorable state of the atmosphere, from a height of—

10 feet above the sea, at a distance of 21.8 miles.
20 feet above the sea, at a distance of 23.3 miles.
30 feet above the sea, at a distance of 24.4 miles.
60 feet above the sea, at a distance of 27.1 miles.

Its geographical position, as given by the Coast Survey, is:

	° ′ ″
Latitude	34 26 47 north.
Longitude	120 27 00 west.
	h. m. s.
Or, in time	8 01 48.0.

Magnetic variation, 13° 50′ east, in September, 1850; yearly increase, 1′.

Fog-bell at Point Concepcion.—A fog-bell, weighing 3,136 pounds, is placed on the edge of the bluff, seaward of the light-house. The striking machinery occupies a frame building, whitewashed, on a level with the ground, and having the front open to receive the bell, which is sounded during foggy or other thick weather, night or day, every thirteen and a half seconds.

The following bearings and distances are taken from the Coast Survey chart of this locality, published in 1853.

The rock off the west end of the San Miguel island, S. ½ E., distant 22 miles.
The east end of San Miguel island, SE. by S. ¼ S., distant 26 miles.
The southwest end of Santa Cruz island, SE. by E. ½ E., distant 40 miles.

Next to the islands of the Santa Barbara channel, Point Concepcion is the most prominent and interesting feature between San Francisco and the peninsula of Lower California. It has very justly and appropriately been termed the "Cape Horn" and the "Hatteras" of the Pacific, on account of the heavy northwesters that are here met with on coming through the channel, with a great change of climate and meteorological conditions; the transition being remarkably sudden and well defined. An investigation of the temperature

of the ocean, northwest and east of the cape, would be highly instructive, as some characteristics would naturally be expected from the abrupt change in the direction of the mountains and coast line. We have frequently seen vessels coming from the eastward with all sail set, and light airs from the north, in a very little time reduced to short canvas upon approaching the cape, and vessels from the northwest coming before a spanking breeze lose it within a few miles after passing the cape into the channel. These last would be fortunate in reaching Santa Barbara in a day. We have known a vessel to be three days working from San Buenaventura to Santa Barbara, whilst a ten-knot breeze was blowing west of Point Concepcion.

During some summer seasons the fog is almost interminable, but more particularly among the islands. For the space of six weeks, with clear days and nights at the cape, the islands have been invisible; rising, however, to an elevation of 1,000 or 1,500 feet, the observer plainly sees the summits of the islands over the sea of fog which envelops them.

When the fogs prevail, they generally roll in from seaward at sunset, and clear away about ten o'clock next morning.

Point Concepcion was discovered by Cabrillo in 1542, and called Cape Galera. He placed it in latitude 36½ N. It was afterwards named Punta de la Limpia Concepcion.

The extent of shore-line from the southern boundary to Point Concepcion is about 250 miles.

EL COXO.

Two miles east of Point Concepcion is the anchorage of El Coxo, off the entrance to the valley of that name. This anchorage is a better one than that of Santa Barbara, and the kelp is not so compact. After passing the point from the westward, at a distance of about three-quarters of a mile, run E. by N., and gradually round the bluff one mile distant from the cape, giving it a berth of half a mile; run on a N.NE. course for three-quarters of a mile, when the valley will open with a sand beach off it. Anchor outside or inside the kelp, according to the choice of depth; five fathoms being obtained within a quarter of a mile of the shore, with hard, sandy bottom. Ten fathoms water will be found half a mile from shore.

A hydrographic sketch of the anchorage was issued from the Coast Survey Office in 1852.

There is a large rancho at El Coxo, and it is one of the very best tracts for grazing. The beef has a finer flavor and more delicacy than any we have met with on the coast. At the head of the valleys and in the mountains is a species of large live oak, very brash when newly cut, but growing hard by seasoning. Willow, for fuel, and water can be obtained here, but neither in abundance. The water is disagreeable to the taste.

The primary astronomical station of the Coast Survey was on the top of the bluff, and between 250 and 300 yards W. ½ S. from the mouth of the creek. Its geographical position is as follows:

	° ′ ″
Latitude	34 26 56.5 north.
Longitude	120 25 39 west.
	h. m. s.
Or, in time	8 01 42.6.

Magnetic variation, 13° 50′ east, in September, 1850; yearly increase, 1′.

In passing this valley, in 1793, Vancouver saw an Indian village, the inhabitants of which made signs for him to land.

ISLANDS OF THE SANTA BARBARA CHANNEL.

The name El Canal de Santa Barbara was given by Vizcaino, in December, 1602, to the narrowest part of the channel lying east and west, and about 24 leagues in length.

Until the Coast Survey first examined in detail the islands lying off the main, between San Diego and Point Concepcion, nothing accurate was known of their number, peculiarities, extent, or position. Upon all maps, of as recent date as 1850, an island called San Juan was laid down, and upon a map of the republic of Mexico, compiled in the United States, and dated 1847, we find no less than twelve large islands, the positions and extent of which are most grotesquely erroneous. The island of San Miguel, the most western of the Santa Barbara group, is placed 70 miles SE. of Point Concepcion, instead of 23 miles SE. by S. ½ S. The same general remarks will apply to the coast line as thereon represented. Three large rivers are made to flow into the sea between Santa Barbara and San Diego bay, which is increased in size to 20 miles by 15, and running north, whilst two others rival it in extent. A Russian chart published in 1848 has a bay and

river on the east side of Point Dume. The geographical positions given previous to the Coast Survey operations are remarkably erroneous. We recollect well, when coming upon this coast, of finding in good nautical authority Point Concepcion over six miles distant from the latest determination in latitude; and we have heard of more than one vessel reaching California with only a school atlas for a chart.

In Findlay's Directory for the Pacific Ocean, published late in 1851, we find a description of the already mentioned San Juan island, but it does not give it a very definite location. It may not be uninteresting to state how the error has been perpetuated. The first notice we can find of this island is its discovery by Martinez, in 1789, on his passage from Monterey to San Blas. The next time it turns up is in Vancouver, vol. II, page 474, where the following account is given:

"At the distance of about eight leagues, somewhere about N. 55° W., or N. 60° W. from Point de la Loma, by a very uncertain estimation, is situated an island called St. John's, between which and the coast we passed without seeing it, [although he previously states having seen San Clemente and Santa Catalina,] nor did we observe it while we remained at anchor, excepting on one very clear evening, when it was seen from the Presidio [of San Diego] at a time when I was unprovided with a compass or any other means of ascertaining its direction, and was therefore only able to guess at its situation.

"It appeared to be low and flat; is but seldom seen from the Presidio of San Diego, and was undiscovered until seen by Martinez, a few years before, in one of his excursions along the coast."

As Vancouver has plotted this island on the line from Point Loma to San Clemente, and as it is generally so placed, we have no hesitation in assuming that, during peculiar states of the atmosphere, the top of San Clemente or of Santa Catalina has been mistaken for another and intermediate island.

Having visited and examined San Clemente, Santa Catalina, San Nicolas, Santa Cruz, and San Miguel, we found them offering no inducements for agriculture, and very few, indeed, for raising stock, while there are so many advantages on the main. In a few words, we may characterize their disadvantages as want of water, and want of fuel, with high, bold, and rugged sides, which in many places become precipitous. The surface of San Miguel and Santa Rosa is rolling, and covered with grass and bushes; the mountains of Santa Catalina almost inaccessible, and San Nicolas, and San Clemente, composed of coarse sandstone, presenting a dry, sandy, and sterile aspect.

On the chart of the coast from San Diego to San Francisco, published by the United States Coast Survey in 1853, a remarkable and beautiful exhibition of the parallelism between the islands and the adjacent coast is presented. The four islands, Anacapa, Santa Cruz, Santa Rosa, and San Miguel, with the rocks seven miles W. by N. from the latter, lying broad off the coast between San Buenaventura and Point Concepcion, have their longer axes parallel to the trend of the shore-line, which is the general direction of the Sierra Conception immediately behind it. In Vizcaino's voyage, this parallelism was noted west of Santa Catalina, "where a regular row of islands exist, five or six leagues distant from each other, all populous, and the inhabitants trading with each other and the main, and the islands following each other in the same direction as the main land."

Cortes shoal, the islands of Santa Catalina, San Clemente, San Nicolas, with John Begg's rock, seven miles from its northern extremity, have their longer axes NW. by W., and parallel to each other, whilst the island of Santa Barbara is on the prolongation of the longer axis of San Clemente. In the third parallel the direction becomes perpendicular to the first described, for from latitude 33° 05′ N. the trend of the coast and hills southward, through the longer axis of Point Loma, will pass through Los Coronados, although the islands lie NW. with respect to each other.

Navigators, in making the *Santa Barbara channel* from the northwest, readily estimate their approach in thick foggy weather by the peculiar odor of the bitumen which, issuing from a large pit on the shore about eight miles west of Santa Barbara and floating upon the water, works *against* the summer winds far beyond Point Concepcion. This set to the westward is found to exist for about four miles off shore, and runs at a maximum velocity of a mile and a half per hour. Further out the current is variable, but even there its greatest velocity is attained when running to the westward. From Point Concepcion it strikes to the southward and westward, being doubtless influenced by a current from the upper coast.

Vancouver is the first who calls attention to the bitumen, in the following language, vol. II, page 449: "The surface of the sea, which was perfectly smooth and tranquil, was covered with a thick slimy substance, which, when separated or disturbed by any little agitation, became very luminous, whilst the light breeze that came principally from the shore brought with it a strong smell of tar, or of some such resinous substance. The next morning the sea had the appearance of dissolved tar floating upon its surface, which covered the

ocean in all directions within the limits of our view, and indicated that in the neighborhood it was not subject to much agitation."

The following remarks of Sir Edward Belcher, in October, 1839, are taken from the Voyage of the Sulphur, vol. I, page 320: "Off this part of the coast to the westward [of Santa Barbara] we experienced a very extraordinary sensation, as if the ship was on fire, and after a very close investigation attributed it to a scent from the shore, it being more sensible on deck than below; and the land breeze confirming this, it occurred to me that it might arise from naphtha on the surface."—See remarks, page . Santa Barbara.

Among the islands, as far as San Nicolas, the current runs to the southward, and there remains little doubt that the steamship Winfield Scott was set out of her course, and upon Anacapa, by this current. On the Cortes shoal it frequently runs against the NW. wind at the rate of nearly two miles per hour. At other times it has been found to run in an opposite direction nearly as strong.

A preliminary chart of the eastern entrance to the Santa Barbara channel accompanied the annual report of the Superintendent of the Coast Survey for 1857.

It may not be here amiss to call attention to the abundance of mackerel found in the channel. We have seen the water fairly alive with them, and have caught them by hundreds. Crayfish of a very large size are found in great numbers along the shores.

The rainy season commences in the early part of November, and continues until the middle of March. The quantity of rain that falls does not average over 15 inches, but some seasons are marked by excessive drought. During the winter SE. gales prevail, and sometimes during the summer months southerly weather will bring up heavy rain.

CORTES SHOAL.

Commencing at the southward, the first object that claims our attention is the dangerous bank and rock called the Cortes shoal, bearing SW. ¼ W. from the southeast end of the island of San Clemente, and distant 46 miles. The extent of this bank has been sounded out carefully, and found much greater than the early examinations led us to suppose. Within the limits of the 50-fathom curve the general trend is parallel with the islands of Santa Catalina, San Clemente, and San Nicolas, and it stretches about 17 miles, from latitude 32° 24′ N., longitude 118° 59½′ W., to latitude 32° 32′ N., longitude 119° 17½′ W., but curves slightly to the southwest. It has an average and nearly uniform width of 3½ miles. The nature of the bottom is hard, composed of white sand, broken shells, and fine coral at the southeast portion; and sand, with broken shells, at the northwest. The shoalest and most dangerous part is that known as the *Bishop rock*, lying five miles from the southeast tail of the bank, and having but 2½ fathoms of water upon it. Around this danger the depth increases gradually, and in an extent of 2½ miles in the general direction of the bank reaches but 15 fathoms. The geographical position of these rocks is, approximately:

	° ′
Latitude	32 25¾ north.
Longitude	119 05 west.

From the northwest end of the island of San Nicolas the rocks bear SE. ½ S., distant 57 miles; and from the southeast end of the island of San Clemente they bear SW. ¼ S., distant 46 miles.

The next shoal spot is one of 10 fathoms, about the middle of the bank, and of limited extent, being only half a mile square within the 15-fathom curve. Its geographical position is, approximately:

	° ′
Latitude	32 26¾ north.
Longitude	119 10½ west.

From the northwest end of San Nicolas, the spot last mentioned bears SE. by S., distant 54 miles; and from the southeast end of San Clemente it bears SW. ¼ W., distant 50 miles. From the Bishop rock it bears W. ¼ N., distant five miles.

To the northwestward of this latter shoal spot the depth is nearly uniform at 49 fathoms for 7½ miles, and between it and the Bishop rock the depth is uniform at about 43 fathoms.

Upon this bank the current is variable, frequently setting against the strong NW. winds with a velocity of nearly two miles per hour, and producing at all times a heavy swell, and even in moderate weather breaking heavily upon the rocks. In passing over the bank at night we have been sensible of our proximity to it by the increased swell. In the detailed examination of 1856 it was found that the general set of the current was to the southward and eastward, and the greatest velocity a mile and a half per hour; but no statement is made concerning the prevailing wind.

The existence of this bank had been reported several times, and the following positions assigned to it:

Swift's island, latitude 33° 08′; longitude 119° 06′, as seen by Captain Aulick, U. S. N.

Rock, latitude 32° 30′; longitude 119° 06′; no authority.

Bank, latitude 32° 28′; longitude 118° 42′; no authority.

It lies in the direct route now followed by the Panama and San Francisco steamships, and was discovered by Captain Cropper, of the steamship Cortes, in March, 1853. His position was determined by bearings upon San Nicolas and San Clemente, and was very close, being within a mile of the latest and best assigned place. He says that the water around it was in violent commotion, and thrown up suddenly in columns at regular intervals of four or five minutes. At first he thought he saw breakers; and occasionally the water broke as on a reef, but he became confident that the disturbance was owing to submarine volcanic agency. The specimens of the bottom negative this idea. He found his depth of water reduced from 42 fathoms to 9, which convinces us that he was on the shoal spot, about the middle of the bank, and saw the water breaking upon the Bishop rock, the same appearance that he witnessed having been seen many times since by others, and the nature of the rocky bottom and depth of water supporting the assumption. The position of the bank was afterwards more closely determined by the commander of the steamship Pacific; but in the Coast Survey operations the 10-fathom spot was found, and the surveying schooner used in that duty was anchored on it five days.

Attention was subsequently called to a more extended examination of the vicinity by the clipper ship S. S. Bishop, (now Grey Eagle,) of Philadelphia, striking upon the rock, since called by her name, (1855,) and, under unfavorable circumstances, two points of rock were supposed to exist, to which approximate positions were assigned. In 1856 the bank was sounded out to the extent of 130 square miles; and from a consideration of the highly favorable circumstances under which this last survey was made, confidence is expressed that the point of rock above mentioned is the only one existing; but as it is very difficult to find detached single points of rock below the surface in a sea-way, we shall not be surprised if others be eventually found. At all events the prudent navigator will give this bank a good berth. Its existence forcibly suggests the probability that other submarine ridges lie parallel to the coast.

A chart of the Cortes shoal was published by the Coast Survey in 1856.

ISLAND OF SAN CLEMENTE.

This, like all the islands of the Santa Barbara channel, is high and bold, the southern end being the higher, and gradually falling to the northward.

The general trend of the island is NW. by W.; its length 22 miles, with an average breadth of two miles, and 50 miles in circuit.

The southwest point of the island bears W. ½ S. from Point Loma, distant 60 miles. At the northwest end is a small indentation of the shore-line forming an anchorage, having a width of three-quarters of a mile, by half a mile in depth, with soundings decreasing from 12 fathoms, on the line of a large rocky islet at the NW. side to a point E. by S., to four and five fathoms close in shore. Kelp will be found in 10 fathoms, but the bottom is tolerably regular and hard. It is anything but a pleasant or safe anchorage in bad NW. weather, and even in heavy southerly weather the swell must roll in disagreeably. A hydrographic sketch of it was issued from the Coast Survey Office in 1852.

Under the SE. end of the island anchorage may be had in the deepest part of the indentation, but the bottom is rocky and irregular. The SE. point is a vast sandstone pyramid; and when it is brought to bear, north, and the shore three-quarters of a mile distant, the anchorage will lie W. by N. ½ N., one and three-quarter mile inside the kelp, in 10 to 15 fathoms, and one-third of a mile from the narrow sand beach at the foot of the cliffs. Outside of the kelp the depth ranges from 10 to 30 fathoms.

This anchorage will afford protection in heavy northwest weather. A hydrographic sketch and view of it accompanies the annual Coast Survey report for 1856.

The soundings around the island show a depth of from 36 to 130 fathoms close in shore, except off the northwest point, from which a reef makes out about a mile.

The Coast Survey secondary astronomical station was at the northwest anchorage, on the grassy rise, just inside of the high-water line, and bore S. 17° E. from the north point of the rock islet before mentioned. Its geographical position is:

	° ′ ″
Latitude	33 02 00 north, (approximate.)
Longitude	118 34 00 west.
	h. m. s.
Or, in time	7 54 16.

Neither wood nor water can be had here. The whole island appears unfit for raising stock, on account of the want of water. Very few trees are found, and the aspect is sterile.

This island was discovered by Cabrillo in 1542, and called by him San Salvador, after one of his two vessels. The present name was given by Vizcaino in 1602.

ISLAND OF SANTA CATALINA.

This island rises to a height of about 3,000 feet, and is remarkable for the great transverse break or depression, five miles from the northern end, running partly through it, and forming an anchorage or cove at each side. The land connecting these is very low, say not over 30 feet; but the hills rise up on each side two or three thousand feet, and, when sighted from the north or south, the whole appears like two very high islands. The view on the Coast Survey chart of 1852 shows this very beautifully, and is highly characteristic. The general trend of the island is W. by N. ¾ N.; its length 17½ miles, with an average breadth of four miles to the southern part, and two miles to the northern, while the shore-line amounts to about 42 miles.

The depression in the island bears S.SW. from Point Fermin, and is distant 18½ miles.

The harbor or cove on the southern side, five miles from the northern end, is only about one-third of a mile in width, but its approaches are bold, and, so far as known, free from hidden dangers. To find it, run along the SW. side of the island and make the depression; then stand in for the opening, keeping a little left of mid-channel until a third of a mile inside of the heads. From thence keep in mid-channel until abreast of the long, low point on the right, and anchor in five fathoms, soft bottom. There is a depth of three fathoms inside of the low point, with hard bottom, but not room enough for a vessel to swing. If the wind is blowing from the NW., vessels will lose it at the heads, and perhaps require to be towed in.

The anchorage on the north side of the depression is also small, with a reef in the centre and two large outlying rocks. A steamer could run in on the west side of the rocks, and anchor off the low beach in 10 fathoms, when the reef would lie N. by E. from her, distant an eighth of a mile. Small craft will here find protection from the prevailing wids, but experience difficulty in getting out, as there is always a swell setting in, and the wind blows in flaws and eddies on account of the high hills. Between the two points forming the anchorage the distance is half a mile, and the depth one third.

The soundings around the island show bold water, from 19 to 75 fathoms, close in shore, with no outlying rocks except off the north cove. The shores are rocky, and on the southern side fearfully abrupt, but on the northern shore there are several indentations, where boats may land at almost any season. Deep and precipitous gulches are formed by the ridges of rock running diagonally across the island from NE. to SW., and occasionally a small valley varies the scene. Four or five settlers cultivate these spots, but their inconsiderable extent precludes the realizing of anything beyond a bare sustenance. About midway between the NW. extremity of the island and the great break there is a spring of good water, and at the SE. point good water has been obtained by sinking wells to a depth of fifty feet or more, but in the intermediate places water found at the same depth is brackish. There is a large pond on the low land between the anchorages, but the water is very brackish. Scrub-oak is obtained for firewood, and a growth of thorny bushes covers the whole island, rendering travelling very difficult. The island was partially stocked with cattle and sheep, and at one time vast numbers of wild goats abounded, but they have helped to supply the California market with fresh meat. In 1863 some old lead mines were rediscovered; the ore is described as argentiferous galena.

From the north end of the near large rock at the north cove, the Coast Survey secondary astronomical station, which was on the edge of the bank, bore S. 25° W. Its geographical position is:

	° ′ ″
Latitude	33 26 34.7 north.
Longitude	118 28 45 west.
	h. m. s.
Or in time	7 53 55.

This island was discovered by Cabrillo in 1542, and called by him La Victoria, after one of his two vessels. It received its present name from Vizcaino in December, 1602, when it was thickly inhabited by a people reported to be very ingenious, particularly in pilfering and concealing; some examples of which accomplishments they gave the Spaniards. Padre de la Ascension, who accompanied this expedition, gives very particular descriptions of a kind of temple to the sun, with images and idols, found near the two coves.

Hydrographic sketches of the anchorages have been published by the Coast Survey.

ISLAND OF SANTA BARBARA.

This is one of the only two small islands of the Santa Barbara group. It lies on the line between the north end of San Clemente and the east end of Santa Cruz, and almost exactly half way between them. From the north end of Santa Catalina it bears W. by S., distant 23 miles.

The extent of the island would not exceed two miles of shore-line; its elevation at the highest part is about 500 feet, and the top has an area of about thirty acres covered with soil, but no water is found, and not a vestige of wood. The shores are rocky and abrupt, presenting on the northeast and south sides perpendicular cliffs exposed to the full force of the ocean swell.

Landing is at all times difficult and dangerous. The water around it is deep, and there are no outlying rocks. It is said to be much more enveloped in fogs than the neighboring islands. Its approximate geographical position is:

	° ′
Latitude	33 30 north.
Longitude	119 02 west.

ISLAND OF SAN NICOLAS.

Of the channel islands this is the most distant from the coast, as well as the driest and most sterile. It is about 600 feet high, abrupt, and, like San Clemente, comparatively flat-topped, but falling to the southern end. The sides are bold and precipitous, and composed of coarse sandstone.

Its general direction is W.NW.; its length is eight miles, with an average and nearly uniform width of 3½ miles, whilst the extent of shore-line is about 22 miles.

The north point of the island bears SE. by E. from Point Fermin, distant 67 miles; the line passing one mile south of the island of Santa Barbara.

At the north end of San Nicolas heavy breakers make out two miles and a half, and the soundings towards the Begg rock show irregular and rocky bottom. Breakers also extend from the southern point to the distance of a mile and three-quarters, according to Kellet. This is doubtless the case in heavy weather.

The soundings around the island show depths varying from 10 to 48 fathoms.

Off the southeast point, which is low and sandy, vessels may anchor in 10 fathoms, hard bottom, with a current running steadily to the southward, which makes the landing bad, as the surf cuts the beach at an acute angle.

The Coast Survey secondary astronomical station was on the sandy point just referred to, and its geographical position determined as follows:

	° ′ ″
Latitude	33 14 12.9 north.
Longitude	119 25 00 west.
	h. m. s.
Or, in time	7 57 40.

This island was not seen by Vancouver in 1793.

The *Begg rock* is situated on the prolongation of the longer axis of the island of San Nicolas, bearing NW. by W. ½ W. from its nearest (NW.) point, and distant seven miles. The rock is about 40 feet high, bold, and well defined, and can be easily seen at a distance of ten miles. The soundings between it and the island indicate the existence of a submarine ridge connecting them. Its approximate geographical position is:

	° ′
Latitude	33 22½ north.
Longitude	119 39½ west.

It was named after the ship John Begg, which struck upon a reef near it, September 20, 1824, and was nearly lost. The foul bottom is covered with kelp. The position of the rock relative to the island of San Nicolas is shown on the general chart of reconnaissance published by the Coast Survey in 1852.

ISLAND OF ANACAPA.

This is, in fact, a curiously formed group of three islands, extending in a nearly E.NE. direction, their entire length being five miles. The west end of Anacapa is a peak 930 feet in height, with a base of over two miles by three-quarters of a mile. This is separated from the middle island by a gap ten feet wide, through which boats can pass. The middle island is nearly two miles long by 500 yards wide, whilst the eastern island is little over a mile long by 500 yards wide. The gap separating the middle and eastern islands is over 200 yards wide, but so completely filled with rocks as to be impassable for boats, which can, however, land on the north side of the island.

The west end of Anacapa is 4½ miles from the eastern point of the island of Santa Cruz, and bears E. ½ N. from it. The depth of water between these islands is 30 fathoms, with a very regular bottom composed of grey sand, coral, and shells. The eastern end of the island bears SE. ¾ E. from the Santa Barbara light, distant 28 miles, and from Point Hueneme or Conversion, the nearest point of the mainland, SW. by S. ⅓ S., distant 9¼ miles.

Anacapa is in latitude 34° 01′ N., and between longitudes 119° 19′ and 119° 24′ W. Upon it the *site for a light-house* has been recommended by the Superintendent of the United States Coast Survey.

The island is composed of coarse, dark grey sandstone, very rotten and crumbling. The sides are perpendicular, and from 250 to 300 feet high. The main peak is marked on the north side by several deep gulches, with almost vertical sides running from the summit to the bluff. The whole formation is filled with innumerable cavities, giving it the appearance of an enormous blackened honeycomb. At the eastern extremity is found a very beautiful arch in one of the outlying rocks. This is well shown in the view accompanying the Coast Survey chart of the vicinity of the island of Anacapa published in 1856. The soil is loose and thin, producing only a few dwarfed species of cactus and a thick-leaved succulent plant common to the sea-coast in dry sandy localities. Not a drop of water is to be found on the island.

Anacapa is a place of great resort for the seal, sea lion, and formerly of the otter, but the latter have been nearly all killed off.

It was on this island that the steamship Winfield Scott ran ashore during a dense fog at midnight, December 2, 1853, in calm weather. The vessel was steaming at full speed, and ran between and upon the rocks with such force that she remained fast by the bow until heavy weather broke her up. The course of the steamer had been taken from Point Concepcion, but without a knowledge of the currents.

Vancouver, in his narrative, calls this island Enneeapah, and repeatedly mentions it by that name; but upon the chart of his survey and explorations it is engraved Enecapah, which has given rise to every variety of spelling. Old Indians at the present time pronounce it En-nee-ah-pagh′, with a very strong guttural intonation.

A chart of Anacapa and the eastern end of Santa Cruz was published by the Coast Survey in 1856, and a preliminary map showing its relation to the mainland in 1857.

ISLAND OF SANTA CRUZ.

This island is the largest of the channel group, and lies broad off the coast opposite the town of Santa Barbara, at a distance of 20 miles. Its general direction is east and west, with a length of 21 miles and an average width of four miles, while the extent of its shore-line is not less than 53 miles.

On the northern side of the island, and near the middle, the shore makes a moderately deep curve, forming a roadstead called *Prisoner's harbor*, at the opening of a valley, where plenty of wood and water can be obtained. Anchorage may be had a quarter of a mile off the middle of the beach in 15 fathoms, sandy bottom; but there is no protection from the heavy swell setting in with a northwester. It must, however, afford excellent refuge in southeast weather. A hydrographic sketch of the harbor was published by the Coast Survey in 1852.

The soundings around the island show deep water close to the shore; but there are rocks showing quite plainly one mile from the southwest point. A chart showing the hydrography of the eastern end of the island was published by the Coast Survey in 1856.

The island is bold, and about 1,700 feet in height. Its eastern part is extremely irregular, barren, and destitute of water; and the surface of the northeastern portion is thickly strewn with large angular pieces of stone, broken as if with a hammer. Several species of cactus and some of the coarse grasses flourish. The only wild animal found here is a small gray fox, of which there are great numbers.

Santa Cruz island is composed of coarse, dark gray sandstone, crumbling and rotten, like that of Anacapa.

The Coast Survey secondary astronomical station was on the eastern side of the fresh water. Its geographical position is:

	° ′ ″	
Latitude	34 01 10.2	north.
Longitude	119 40 00	west.
	h. m. s.	
Or, in time	7 58 40.	

From the Santa Barbara light we have the following bearings and distances:

East point of Santa Cruz island SE. ⅔ S., distance 24 miles.

Prisoner's harbor S. by E. ½ E., distance 22 miles.

West point of Santa Cruz island S. by W. ½ W., distance 21 miles.

A site for a light-house at the eastern end of the island has been reported upon and recommended by the Superintendent of the Coast Survey to the Light-house Board.

This island was called Juan Rodriguez by Ferrelo, who commanded the ships of Cabrillo after his death, which took place either in Prisoner's harbor, or in Cuyler's harbor (island of San Miguel.) The greater probability rests with the former, as there they could obtain water, and oak wood for repairs, &c., while neither is to be had in the last-mentioned harbor, except water, during the rainy season.

The group comprising Santa Cruz, Santa Rosa, and San Miguel, was discovered and called San Lucas by Cabrillo in 1542.

ISLAND OF SANTA ROSA.

This is the middle island of the group off the coast between Santa Barbara and Point Concepcion. Its general shape is that of a parallelogram, with the direction of the longer axis almost exactly east and west, and fifteen miles in length; and the shorter north and south, giving it a width of ten miles. The extent of shore-line is about 42 miles.

On the northwest side of the island, and midway between the north and west points, a reef extends out for a distance of a mile and a quarter.

There is a good passage between Santa Cruz and Santa Rosa, with a width of five miles, and one between it and San Miguel of four miles. Both passages are frequently used by the California and Panama steamships.

The soundings around the island do not show as deep water as around the others. On the northwest and northeast sides from fifteen to twenty fathoms are found two miles from shore, but on the southeast and southwest sides the water is much deeper.

The outline of the island is bold, but not so high as Santa Cruz. The hills are rolling, and covered with coarse grass and bushes. No harbors exist around its shores, which are steep and broken. The relative position of Santa Rosa in the group of the Santa Barbara islands is shown on the reconnaissance chart of the Coast Survey published in 1852.

The approximate geographical position of the south point of the island is:

	° ′	
Latitude	33 53	north.
Longitude	120 04	west.

For the western point we have:

Latitude	33 58½	north.
Longitude	120 12½	west.

On some early Spanish charts the western two of the Santa Barbara islands are called San Miguel and Santa Rosa, (naming the western first,) and upon others Santa Barbara and San Miguel. The present names and order are those adopted by Vancouver in 1793.

ISLAND OF SAN MIGUEL.

This is the western of the Santa Barbara Channel islands, its longer axis lying E. ½ N., and 7½ miles in length, with an average breadth of 2½ miles. The extent of shore-line is 21 miles. Its western extremity is bold and narrow, gradually increasing in breadth until it attains 3½ miles. As seen from the southwestward, this end of the island appears to be several hundred feet in height, and composed of sand dunes, therein differing from all the other islands. The eastern face is nearly straight for two miles; the southern face is nearly straight along its whole length, with high, abrupt shores; and from 30 to 37 fathoms water are found close in shore. On the NE. side of the island is the small bay called *Cuyler's harbor*, off which lies a rock or islet more than a fourth of a mile long, and several hundred feet high. From this islet to the deepest part of the harbor the distance is a mile and a quarter, and the course SW. Close under the western side of the harbor is anchorage in six fathoms, secure from every wind except the north, which rarely blows here. The eastern part of the bay is full of rocks and reefs, and ought to be avoided. The reef in the middle of the bay bears SW. from the west end of the islet, and is distant half a mile. It is the same distance from the west point of the bay, near the anchorage, and bears E. by S.

SW. by S. ½ S. from the west end of the islet is a rock, and rocky bottom, distant a third of a mile; and on the same line another, half a mile distant. The southern part of the islet is about half a mile from the east shore of the bay. The bay shores are high, steep, and rolling, and covered with coarse grass and bushes. There is no water here in summer, but during the winter water drains down the gully at the beach in the middle and southern part of the barbor.

A hydrographic sketch of Cuyler's harbor was published by the Coast Survey in 1852.

The western point of the island bears S. by E. ¼ E., distant 25 miles, from Point Concepcion, and SE. by S. ½ S., distant 35 miles, from Point Arguello.

A *sea-coast light* has been reported upon for this point of the island, and the subject referred to the Light-house board.

Sheep and some stock have been placed upon San Miguel, but the success of the experiment has been doubtful—certainly unremunerative. A peculiar bobtail fox is found here.

The Coast Survey secondary astronomical station is on the SW. part of Cuyler's harbor, about forty feet up, on the side-hill. Its geographical position is:

	° ′ ″
Latitude	34 03 00 north, (approximate.)
Longitude	120 20 27 west.
	h. m. s.
Or, in time	8 01 21.8.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is IX*h.* XXV*m.* The mean rise and fall of tides is 3.7 feet; of spring tides, 5.1 feet; and of neap tides, 2.8 feet. The mean duration of the flood is 6*h.* 13*m.*, and of the ebb 6*h.* 5*m.* The average difference between the corrected establishment of the a. m. and p. m. tides of the same day is 1*h.* 40*m.* for high water, and 1*h.* 9*m.* for low water. The differences, when the moon's declination is greatest, are 2*h.* 54*m.* and 2*h.* 12*m.*, respectively. The average difference in height of these two tides is 1.6 foot for the high waters, and 2.5 feet for the low waters. When the moon's declination is greatest these differences are 2.6 feet and 3.6 feet, respectively. The average difference of the highest high and lowest low waters of the same day is 5.8 feet, and when the moon's declination is greatest, 6.8 feet. The highest high tide in the twenty-four hours occurs about 8*h.* 35*m.* after the moon's upper transit, (southing,) when the moon's declination is north, and about 3*h.* 51*m.* before when south. The lowest of the low waters occurs about 7½ hours after the highest high tide.

To find the times of high and low waters first compute them for San Diego, and, from the numbers thus obtained, subtract 19*m.* for Cuyler's harbor.

San Miguel was discovered by Cabrillo in 1542, and Cuyler's harbor is supposed by some to be the bay in which he wintered. He died January 5, 1543, having directed Bartolome Ferrelo, his pilot, to assume the command of the expedition and continue the exploration as far north as possible. Ferrelo afterwards named the island in whose harbor his commander had wintered, Juan Rodriguez. It is sometimes called San Bernardo.

Cuyler's harbor was named by the U. S. Coast Survey in 1852.

Two rocks, showing themselves well above water, lie NW. by W. from the western extremity of San Miguel, the larger being distant five miles. It bears S. ½ E., distant 22 miles, from Point Concepcion, and S.SE., distant 30 miles, from Point Arguello. Off the inner and smaller rock a reef extends a short distance to the southward and westward. Deep water is found around the rocks, and vessels may pass between them. The total extent of shore-line of the Santa Barbara islands is about 232 miles.

FROM POINT CONCEPCION, NORTHWARD.

The first headland to the northward of Point Concepcion is *Point Arguello*,* distant 12 miles, and bearing NW. by W. ½ W. The shore is bold and compact, curving slightly to the eastward between the two points, and the mountains immediately behind are not less than 3,000 feet in height. Two or three hundred yards off Point Arguello are some detached rocks, upon which the steamship Yankee Blade struck and was lost on the 1st of October, 1854, and 415 persons perished.

From this point the trend of the coast is NW. to Point Reyes, 240 miles distant, passing tangent to Point Sur in latitude 36° 19½′ N., and inside the South Farallon.

Eight miles north of Point Arguello a small stream empties into the ocean. It was considered by Vancouver the largest he had seen south of the Columbia, but it is insignificant and unimportant. He states that on the old Spanish charts it is called the Rio de San Balardo. On a French chart of 1841 it is called the San Geraldo; on a recent Russian chart we find it called the river Benardo; on the Coast Survey charts it is designated *La Purissima*, from the mission La Purissima Concepcion, situated a few miles inland. On the State map of California it is called the San Ines. It rises in longitude 119° 20′, about 15 miles from the coast, and runs parallel therewith behind the Sierra Concepcion.

The first point northward of Point Arguello is *Point Purissima*, off which makes a reef about a fourth of a mile to the S.SW. This is known on the coast as *Point Pedernales*, signifying Point of Flints, but now generally and erroneously printed Pedro Nales. Formerly it was called San Pedro Nolasco. Near this point the steamship Edith was lost in 1849. The State survey of California places Pedernales only two miles to the northward of Arguello.

Between Points Sal and Purissima a small stream called the Guyamas opens.

From Point Arguello N. by W. ⅔ W., and distant 19 miles, is Point Sal,* which is marked by streaks of yellow sand, except at the extreme point. The extremity is formed by high, round, black rocks, off which are several sunken rocks, extending half a mile to the southward and westward. This stretch of the coast is very similar to that behind Concepcion and Arguello, but, after passing Point Sal, the mountains fall back, and the shore is formed of sand-hills. The general bend hence is north, until the shore commences sweeping westward to form the bay of San Luis Obispo, and the shores become high and abrupt.

The line of *equal magnetic variation* of 14° east cuts the coast line in latitude 35° 01′ N., and crosses the meridian of 121° 30′ W. in latitude 33° 55½′ N. It moves annually southward about a mile and a half

SAN LUIS OBISPO.

This bay is an open roadstead, exposed to the southward, and even during heavy northwest weather a bad swell rolls in, rendering it an uncomfortable anchorage. The landing is frequently very bad, and often impracticable, but the best place is in the mouth of the creek, keeping the rocks at its mouth on the starboard hand. Fresh water may be obtained at a small stream opening on the beach half a mile west of the creek. In the coarse sandstone bluff between these two places are found gigantic fossil remains.

Off *Point San Luis*, which forms the SW. part of the bay, are some rocks, and in making the anchorage vessels should give this point a berth of half a mile, passing in six or eight fathoms; run on a N. by E. course, and anchor three-fourths of a mile from shore in six fathoms, sticky bottom; four fathoms can be got about a fourth of a mile from the beach. In winter, anchor far enough out to clear Point San Luis if a southeaster should come up. During southerly weather landing is frequently effected at the watering place, when impracticable at the creek.

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* Named by Vancouver in 1793. A view of it is given on the Coast Survey sheet of 1853.

The distance from the rock off Point San Luis to the mouth of the creek is a mile and a half; from the same rock to a white rock bearing N. 70° E. the distance is two and a quarter miles; and a black rock lies halfway between the white rock and the mouth of the creek.

The Coast Survey secondary astronomical station is on the bluff at the east side of the small fresh-water stream, west of the creek, and its geographical position is:

	° ′ ″
Latitude	35 10 37.5 north.
Longitude	120 43 31 west.
	h. *m.* *s.*
Or, in time	8 02 54.1.

The magnetic variation, 14° 17′ east, in February, 1854; yearly increase, 1′.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is X*h.* VIII*m.* The mean rise and fall of tides is 3.6 feet; of spring tides, 4.8 feet; and of neap tides, 2.4 feet. The mean duration of the flood is 6*h.* 25*m.*, and of the ebb 5*h.* 58*m.* The average difference between the corrected establishments of the a. m. and p. m. tides of the same day is 1*h.* 24*m.* for high water, and 1*h.* 0*m.* for low water. The differences when the moon's declination is greatest are 2*h.* 0*m.*, and 1*h.* 28*m.*, respectively. The average difference in height of these two tides is 1.5 foot for the high waters, and 2.0 feet for the low waters. When the moon's declination is greatest, those differences are 2.0 feet and 3.1 feet, respectively. The average difference of the higher high and lower low waters of the same day is 5.4 feet, and when the moon's declination is greatest 6.1 feet. The higher high tide in the twenty-four hours occurs about 9*h.* 32*m.* after the moon's upper transit, (southing,) when the moon's declination is north, and about 2*h.* 54*m.* before, when south. The lower of the low waters occurs about seven hours after the higher high tide. The greatest observed difference between the two low waters of one day was 4.0 feet, and the greatest difference between the higher high and lower low waters of one day was 8.3 feet.

To find the times of high and low waters, first compute them for San Diego, and to the times thus obtained add 30*m.* for San Luis Obispo.

The town of San Luis Obispo, which takes its name from the mission of that name, founded September 1, 1772, is not on the bay, but is situated about ten miles in the interior, in the middle of an extensive and excellent grazing country. Communication is maintained with San Francisco and other ports by regular steamers and lines of sailing packets.

The bay was discovered by Cabrillo in 1542, and called by him Todos Santos.

A preliminary chart of the harbor of San Luis Obispo was issued from the Coast Survey Office in 1852.

To the northwest of the Bay of San Luis Obispo rises to a great height the *Monte de Buchon*, which is readily distinguished in coming from the northward or southward.

We have been informed by old otter hunters on this coast that there exists a sunken rock about eight miles S.SW. from Point San Luis, and furthermore that they had found kelp upon it in four fathoms. On the old Spanish charts an island appears laid down in that direction, but distant about eight leagues. One of the Pacific mail steamships laid to in a southeast gale and thick fog off Point Concepcion, and drifting to the northward came unexpectedly upon a sunken rock, upon which the sea was breaking heavily. The commander supposed the vessel to be then off Point Sal, and had so plotted the rock upon his chart; but upon being informed of the alleged existence of a rock off San Luis Obispo, he was satisfied that he had been near it, but unfortunately had no opportunity of determining his position.

This locality demands a thorough examination, as it is in the direct track of the whole California trade from San Francisco.

From Point San Luis the coast trends in a straight line W.NW., for a distance of eight miles, and close along the shore of this stretch are several large rocks. Thence the coast trends abruptly to the north, running to the high conical rock called *El Moro*, distant eight miles—these two shores forming the seaward base of Mount Buchon.

From El Moro the shore-line gradually trends to the westward, thus forming a deep indentation or bay, called *Los Esteros* on the old Spanish charts, but designated as the Estero bay on the Coast Survey chart. It was discovered by Cabrillo in 1542, and here he obtained wood and water. Behind El Moro are several lagoons or streams, and the high land retreats for some distance, leaving the shore low and sandy, while the north shore is rugged, and guarded by rocks. The NW. point of the bay is called *Punta de los Esteros* on

the old Spanish charts, and bears NW. ½ N. from the west point of Mount Buchon, distant 13 miles. A line joining these two points shows that the bay is about five miles deep.

A view of El Moro is given on the Coast Survey sheet for 1853.

From Point Arguello, Punta de los Esteros bears NW. by N., distant 53 miles.

From Point Los Esteros to the western point of the anchorage of San Simeon the coast runs nearly straight NW. by W. for a distance of 15 miles. The shores are not so bold as to the southward or northward, and the mountains fall well back, leaving a fine rolling country of no great elevation, and well suited to agriculture. We have seen wild oats growing here over six feet in height—not one or two stalks, but in acres.

BAY OF SAN SIMEON.

This is a small exposed roadstead, but affords tolerably good anchorage during northwest winds. The southwest point of the bay bears NW. by W. from Point Esteros, and is distant 15 miles. The indentation of the shore-line forming the bay trends between N.NW. to N. for half a mile, and then sweeps away to the westward about a mile and a half, gradually taking a southeast direction. The land behind the bay is comparatively low and gently rolling, the high hills retiring well inland.

Vessels coming from the northward may run boldly round the SW. point, within a few hundred yards of the shore in eight or nine fathoms, round up to north and anchor anywhere off the sand beach, in five fathoms, hard bottom, and a little more than a quarter of a mile from shore. The beach is half a mile long, stretching well out, and rendering the landing disagreeable with any swell; but in such cases it is usual to land at the western part of the beach. Eastward of the sand beach the shore-line is bluff and guarded with rocks. Vessels from the southward must make short tacks close in shore, or they will assuredly miss it. The only sure marks for it are the Piedras Blancas, as will be hereafter shown. It was in this bay that the steamship Pioneer put in leaking badly; was driven or dragged upon the beach, and after being abandoned by the underwriters was got off and carried to San Francisco. The bay affords not the slightest refuge in southerly weather. A hydrographic sketch of it was published by the Coast Survey in 1852.

In making this harbor from the northward vessels must sight the *Piedras Blancas*, (White Rocks,) four miles W. ¾ N. of the SW. point of San Simeon. They are two large white sharp-topped rocks, and nothing else like them is found on this part of the coast. The geographical position of the outer and larger rock is, approximately:

	° ′
Latitude	35 39 north.
Longitude	121 15 west.

From Point San Luis they bear NW. ¾ W., distant 38 miles.

From Point Esteros they bear NW. by W. ½ W., distant 18 miles.

From Point Arguello they bear NW. ½ N., distant 72 miles.

The secondary astronomical station of the Coast Survey at San Simeon is on the rise just off the beach, and bearing N. 5° W. from the SW. point of the bay. Its geographical position is:

	° ′ ″
Latitude	35 38 24.4 north.
Longitude	121 10 22 west.
	h. m. s.
Or, in time	8 04 41.5.

This bay is supposed by some to be the "Bay of Sardines" of Cabrillo, where he anchored and landed in 1542.

A view of the Piedras Blancas is given on the Coast Survey sheet of 1853.

From *Piedras Blancas* the coast trends NW. ½ W. for a distance of 57 miles, in an almost perfectly straight line. At a distance of 18 miles from these rocks the above-mentioned bearing cuts a bold bluff and rounded point called Punta Gorda, off which, and for two or three miles along the shore northward, there are many rocks. This point is the *Cape San Martin* of Cabrillo. He placed it in latitude 37° 30′ N.; but applying the correction obtained from his erroneous determination of San Diego, we obtain 35° 50′ N. as the position of San Martin, which is very nearly its proper latitude. As there is one point under Cape Mendocino, more generally known as Punta Gorda, it is recommended that this point retain the name given to it by Cabrillo, especially as all his names have been cast aside.

Continuing on the same bearing, and at a distance of 49 miles from Piedras Blancas, is *Point Sur*, sometimes called Lobos, making out nearly half a mile. As seen from the north or south, at a distance of 10 miles, Point Sur appears as a high, large, round-topped island; but upon approaching it a low neck of land is seen, connecting it with the main. Its approximate geographical position is:

	° ′
Latitude	36 19 north.
Longitude	121 52 west.

Vancouver, in passing down the coast in 1793, thought this "small, high, rocky lump of land, lying nearly half a mile from the shore," was detached, and that it formed an island.

The highest peak of the range bordering the coast lies six miles square in from Point Sur, and attains an elevation of 4,414 feet.

A view of the point is given on the Coast Survey sheet of 1853.

Still continuing on the same bearing, 57 miles from Piedras Blancas and 7½ miles from Point Sur, another slightly projecting point is passed, about a mile to the eastward of the course. Thence the coast trends more to the eastward, running N.NW. for eight miles, to *Point Cypress*, and passing *Point Carmel*, the south point of *Carmel bay*.

From *Point Arguello* to *Point Sur* the bearing is N. 44° W., and the distance 120 miles. From *Point Sur* to *Punta de los Reyes* the bearing is N. 43° W., and distance 118 miles.

The mountains, which had fallen back behind Los Esteros, gradually approach the shore-line north of San Simeon, and about 10 miles north of Piedras Blancas they come down abruptly to the coast, and run parallel with it to Point Carmel, forming the boldest and most compact shore that we have yet passed, and attaining a uniform elevation of nearly 4,000 feet. These mountains were called by Cabrillo the "Sierras Altas," but at present the range is known as the *Sierra de Santa Lucia*. From their abrupt faces we have seen cascades falling from a height of forty or fifty feet directly into the sea.

CARMEL BAY.

Between Point Carmel and Point Cypress, which are about three miles apart, lies the small, rocky and unsafe bay of Carmel. At the southern extremity is a small cove, sufficiently land-locked and protected for small vessels. In the vicinity there is an extensive quarry of granite, and several small coasting vessels are employed for its transportation to San Francisco; but there is so little space that they are compelled to warp in and out by buoys placed at the entrance. Point Cypress, the north point of the bay, is low, and covered with cypress to the water, and is the first wooded point met with in coming from the southward. The upper branches of the trees are spread out by the influence of the strong prevailing winds, and present a flat or umbrella-like appearance.

The Mission del Carmelo is situated but a short distance from the shores of the bay, and can be seen from the water in certain directions. After the abolishment of the Society of Jesus, in Lower California, by the emperor Charles III of Spain, with the transfer of the administration of the missions to the Dominican monks, and of the property to the Franciscan order, the Visatador, Don Josef de Galves, of the latter order, in July, 1768, visited San Diego and Monterey, for the purpose of establishing missions. On the 3d of June, 1770, he founded that of San Carlos de Monterey, now usually called the *Carmel mission*.

The name Rio Carmel was applied to the small stream emptying into Carmel bay, by Vizcaino, in December, 1602.

From *Point Cypress to Point Pinos* the general direction of the shore is N. ¾ E., and the distance four miles.

POINT PINOS

makes out as a low rounding point, bringing the pines, with which it is covered, within a quarter of a mile of the shore, off which the rocks make out a quarter of a mile, and the line of three fathoms nearly half a mile, when the depth suddenly increases to 10 or 15 fathoms, and at a mile reaches 40 or 45 fathoms. The three-fathom line follows the shore within a third or half a mile into Monterey, whilst outside of that line the depth increases as suddenly as off the point. Vessels should always give Point Pinos a good berth, as a very heavy swell almost invariably sets upon it. This point is the northern termination of the long and elevated range called Sierra de Santa Lucia, extending southward and forming the bold rocky coast-line to San Luis Obispo.

A view of Point Pinos is given on the Coast Survey sheet of 1853.

POINT PINOS LIGHT-HOUSE.

This is a secondary sea-coast light, situated upon the northwestern part of Point Pinos, at the face of the growth of pines. The building is a grey granite dwelling one story in height, surmounted by a tower and lantern, which is 35 feet above the ground. The illuminating apparatus is of the third order of Fresnel, and shows a *fixed light of the natural color*, from sunset to sunrise. It illuminates about four-fifths of the horizon, and is elevated 91 feet above the level of the sea. During ordinary clearness of the atmosphere it can he seen from an elevation of—

10 feet, at the distance of 14.5 miles.

20 feet, at the distance of 16.0 miles.

30 feet, at the distance of 17.1 miles.

Its geographical position, as determined by the triangulation of the Coast Survey, is:

	°	′	″	
Latitude	36	37	58.1	north.
Longitude	121	55	00	west.
	h.	*m.*	*s.*	
Or, in time	8	07	40.0.	

The primary astronomical station of the Coast Survey is about half a mile eastward of the light, and has the following geographical position:

	°	′	″	
Latitude	36	37	59.3	north.
Longitude	121	54	25	west.
	h	*m.*	*s.*	
Or, in time	8	07	37.7.	

Magnetic variation, 14° 58′.3 east, in February, 1851, with a yearly increase of 1′.

A topographical sketch of Point Pinos is given in the annual report of the Coast Survey for 1851.

BAY OF MONTEREY.

Point Pinos forms the southwest point of this bay, and *Punta de la Santa Cruz*, (forming the western shore of the anchorage of Santa Cruz,) the northwest point. A line joining these two points runs N. 27° W., 19⅜ miles, and the greatest width of the bay, near the mouth of the Salinas river, is 9⅜ miles.

From Point Pinos to the anchorage off the town of Monterey, the course is E. by S. ½ S., and the distance three miles. The shore towards the town is rugged, composed of granite, and covered with a heavy growth of fir; but to the eastward of the town is a long, sandy beach, backed by sand dunes of slight elevation. For a distance of 10 miles along this beach the line of three fathoms lies at a distance of 150 yards off shore, the water deepening rapidly beyond that, and the bottom almost everywhere hard.

Vessels coming from the northward, bound to Monterey, follow the coast from *Point Año Nuevo* to Point Santa Cruz, then run well into the bay, but not too far, for fear of losing the wind, and to avoid the set of the heavy swell rolling towards the beach. Leaving Point Santa Cruz and keeping on a SE. by E. course about 15 miles, will bring vessels into 25 fathoms, and nearly two miles from the beach; thence a south course for eight miles will bring them to the anchorage in 10 fathoms, and half a mile from the landing. These precautions are necessary, because Point Pinos, with the whole bay, is almost continually enveloped in a dense fog. Very frequently the coasting steamers have to run for the beach, and then be guided by the rote to the anchorage.

A direct course from Point Año Nuevo to the anchorage is SE. ½ E., and the distance 36½ miles. From Point Pinos to Point Año Nuevo the bearing is N. 47° W., and the distance 34 miles.

By anchoring well in at the western side of the anchorage vessels will avoid much of the swell that comes in with the heavy northwest winds, but never sufficient to make any berth there dangerous. In heavy southerly weather Point Pinos breaks the swell, but the wind draws very strong over the anchorage. The water shoals from 15 to 3 fathoms in a distance of 300 yards, and the lead should be used to avoid running in too far.

When the California mail steamships stopped at Monterey they frequently ran outside of Point Pinos, or in very dangerous proximity to it. This led to their firing a gun when approaching the harbor during foggy or dark weather, and upon the report being heard at the fort a gun was fired in answer, and the

exchange kept up until the steamer was safe at her anchorage. We were encamped at Point Pinos when the steamship Carolina was brought in by this means, after she had got nearly as far down as Carmel bay.

The approximate geographical position of the end of the wharf, abreast of the custom-house at Monterey, is:

	° ′ ″
Latitude	36 36 17 north.
Longitude	121 52 27 west.
	h. *m.* *s.*
Or, in time	8 07 29.8.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is X*h.* XII*m.* The mean rise and fall of tides is 3.4 feet; of spring tides, 4.3 feet; and of neap tides 2.5 feet. The mean duration of the flood is 6*h.* 31*m.*; of the ebb, 6*h.* 2*m.*; and of the stand, 0*h.* 35*m.* The average difference between the corrected establishment of the a. m. and p. m. tides of the same day is 1*h.* 44*m.* for high water, and 1*h.* 2*m.* for low water. The differences, when the moon's declination is greatest, are 2*h.* 40*m.* and 1*h.* 28*m.*, respectively. The average difference in height of these two tides is 1.4 feet for the high waters, and 2.4 feet for the low waters. When the moon's declination is greatest these differences are 2.2 feet and 3.7 feet, respectively. The average difference of the higher high and lower low waters of the same day is 5.3 feet, and when the moon's declination is greatest, 6.3 feet. The higher high tide in the twenty-four hours occurs about 9*h.* 36*m.* after the moon's upper transit, (southing,) when the moon's declination is north, and about 2*h.* 50*m.* before, when south. The lower of the low waters occurs about seven hours after the higher high tide. The greatest observed difference between the low waters of one day was 4.3 feet, and the greatest difference between the higher high and lower low waters of one day was 7.9 feet.

To find the times of high and low waters, first compute the times for San Francisco, and from the numbers thus obtained subtract 1*h.* 44*m.* for Monterey.

The town of Monterey presents a very pretty appearance as seen from the water. Immediately behind it the country rises in plateaus, diversified by hill and valley, and beautifully dotted by oak groves. It was the capital of California while under the rule of Mexico, and for some years after it became a State.

A Portuguese company has been formed here to engage in the whale fishery, and even with inadequate means it succeeded in obtaining over 16,000 gallons of oil (which sold for $12,000) in less than a year. Other companies have since been formed; their cruising ground is the bay of Monterey, and a short distance to sea. Operations are carried on by means of boats furnished with bomb lances during the season, which usually lasts nine months—from March to November.

Regular communication is kept up with all parts of the coast by steamers and numerous sailing vessels. Stages communicate with Santa Cruz and all the towns to San Francisco.

Following the shore from the town of Monterey, northward, it presents a uniform sand beach running nearly north, backed by low dreary sand dunes, producing sparsely the coarsest grasses and bushes, and entirely destitute of fresh water. This waste extends to the *Salinas river*, of which we reach the great bend at about 9½ miles from Monterey, and only one hundred yards from the beach. From Point Pinos it bears N. 30° E., distant 8½ miles. From this bend the river follows the line of the beach, just inside of the low sand dunes, for a distance of 4½ miles, and then disembogues. From Point Pinos it bears N. 18° E., and is distant 12¾ miles. This river has been designated by a variety of names—as Buenaventura, Monterey, and Salinas; but it is now generally known by the latter. It rises in the latitude of the Piedras Blancas; one branch about 20 and the other 33 miles from the coast. These branches meet at San Miguel, and thence the stream runs parallel with the coast and behind the Sierra Santa Lucia. From its mouth, which is only 60 yards wide at low water, to the entrance to the *Rio del Pajaro*, or San Antonio, the distance is 2¼ miles; the shore trending to the N.NW. The entrance of that river bears N. 11° E., 14 miles from Point Pinos.

From here the coast runs NW. nearly straight to Atos creek, a distance of seven or eight miles, and about six miles E. by N. of Santa Cruz, with the shore rocky and abrupt.

North of the Salinas river commence rich meadow and table lands, affording to the settler spots unsurpassed for productiveness, even in the prolific State of California.

A remarkable sub-marine valley, similar to that off Point Hueneme, has been discovered, and to some extent traced out in this bay. The head of the valley is five-eighths of a mile south of the mouth of the Salinas river, and the 20-fathom line is only a quarter of a mile off the beach, the depth increasing to 50

fathoms in the next quarter of a mile. At this distance from shore the 20-fathom lines are three-eighths of a mile apart. The general direction of the valley for the next two miles is SW. ½ W., where we find a depth of 117 fathoms, and the 50-fathom lines lie about five-eighths of a mile apart; thence the valley runs about west, reaching a depth of 170 fathoms in a mile, and 240 fathoms in 3¼ miles, with 42 fathoms, less than a mile to the north of this. The soundings are not numerous enough to trace its outlines in deep water; but the indications are that, for 10 miles of its length, it runs S. 60° W., with no bottom at 315 fathoms. The only available boat landing upon the beach of the bay shores is at the head of this sub-marine valley. There are no indications on the land of this peculiar formation, except that at its head the bay very gradually reaches its greatest easting.

An extensive valley, called the Salinas plains, through which comes the Salinas river, extends inland from the eastern part of Monterey bay, nearly to the mission of San Miguel, situated on a plateau of the San Bruno mountains. This valley is said to be nearly 90 miles in length, and in breadth varying from two to ten. It contains some 200,000 acres of good agricultural lands, and the remainder affords excellent pasturage for horned stock, horses, and sheep.

The bay of Monterey was discovered by Cabrillo in 1542, and called the Bay of Pines. It was surveyed by Sebastian Vizcaino in 1602, and the name was changed to Puerto de Monte-rey, in honor of the Spanish viceroy of Mexico, Don Gaspar de Zuniga, Count de Monte-rey, who despatched the expediton.

It was used by the Spanish galleons on their return from Manilla to Mexico.

A preliminary chart of Monterey bay was published by the Coast Survey in 1857.

The line of *equal magnetic variation* of 15° east cuts the coast line of Monterey bay in latitude 36° 45′ N., about half way between the great bend and mouth of the Salinas river, and crosses the meridian of 123° 0′ W., in latitude 36° 36′ N. This line moves annually southward about a mile and a half.

SANTA CRUZ HARBOR.

This harbor or anchorage is at the northwest part of the bay of Monterey, and is of very limited extent. It is protected from all the winds from the northward, but exposed to the full sweep of southerly gales, and many coasters have been driven ashore during the winter season. It is about three-quarters of a mile in depth northward, by 1½ mile east and west.

Vessels coming from the northward, after leaving Point Año Nuevo, follow the coast-line on a general course E.SE. for about 18 miles. The shore for this distance is abrupt, jagged, and moderately elevated, with a range of high hills, or mountains whose summits in summer are almost continually enveloped in fog. Skirting the shore at a distance of half a mile a depth of 6 to 10 fathoms can be carried, and upon making Point Santa Cruz, the top of which is moderately level for some distance back, four fathoms are obtained within a quarter of a mile of it; round up and run along in five fathoms until abreast of the beach, where good anchorage will be found half a mile from shore.

Vessels from the south in summer keep well into Monterey bay, to escape the full force of the northwesters and the heavy head sea.

During the winter months anchor well out, so as to be able to clear the shore westward of Point Santa Cruz in case a southeaster springs up.

Landing on the beach is generally disagreeable, as it extends out some distance, but boats usually land at the embarcadero, at the foot of the bluff in the NW. part of the harbor.

The beach is over half a mile in length, and between its eastern extremity and the bluff point empties the San Lorenzo river, a small stream running past the town and mission, which is situated a mile inland.

A chart of the harbor and vicinity was published in the Coast Survey report for 1854.

The country about Santa Cruz is exceedingly productive, and now thickly settled. A steamer runs regularly in the trade between this place and San Francisco, and numerous coasters find abundant freight from here and the Pajaro country to San Francisco.

Regular stage communication is maintained with San Francisco and Monterey.

The secondary astronomical station of the Coast Survey was at the top of the bluff at the embarcadero. Its geographical position is:

	° ′ ″	
Latitude	36 57 26.9	north.
Longitude	122 00 10	west.
	h. m. s.	
Or, in time	8 08 00.7.	

An examination for the location of a *harbor light* has been made, and the site recommended to the Light-house Board by the Superintendent of the Coast Survey.

The high mountain, N. 25° E., 12½ miles from Santa Cruz, is named Mount Bache, and attains an elevation of 3,791 feet.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is X*h.* XVIII*m.* The mean rise and fall of tides is 4.1 feet; of spring tides, 5 5 feet; and of neap tides, 2.9 feet. The mean duration of the flood is 6*h.* 47*m.*; of the ebb, 5*h.* 45*m.*; and of the stand, 0*h.* 20*m.* The average difference between the corrected establishment of the a. m. and p. m. tides of the same day is 1*h.* 44*m.* for high water, and 1*h.* 2*m.* for low water. The differences, when the moon's declination is greatest, are 2*h.* 40*m.* and 1*h.* 28*m.*, respectively. The average difference in height of these two tides is 1.4 feet for the high waters, and 2.4 feet for the low waters. When the moon's declination is greatest these differences are 2.2 feet and 3.7 feet, respectively. The average difference of the higher high and lower low waters of the same day is 6.0 feet, and when the moon's declination is greatest, 7.0 feet. The higher high tide in the twenty-four hours occurs about 9*h.* 32*m.* after the moon's upper transit, (southing,) when the moon's declination is north, and about 2*h.* 54*m.* before, when south. The lower of the low waters occurs about 7*h.* after the higher high tide.

It was off Point Santa Cruz that Cabrillo is supposed to have anchored on the 17th of November, 1542, upon his return from the northward.

From Point Santa Cruz to *Point Año Nuevo* the distance is 18 miles, and the general direction W. by N. ¾ N., at first curving to the southwestward of that course, and then to the northward, until within three miles of the rock of Point Año Nuevo, when the shore curves well to westward, (for the last mile to the southwest,) forming an anchorage protected somewhat against the heavy swell from the northwest, and having a depth of five fathoms within less than half a mile of the shore, and from 10 to 15 fathoms at the distance of a mile.

At a quarter of a mile from the point lies a black jagged islet, consisting of a sloping ledge of rocks covered with a stratum of yellow clay about four feet thick, and this again covered with a mound of sand about 30 feet high. Upon this a *light-house* is to be built. The point itself is composed of rolling hills of shifting sand, varying from 20 to 100 feet in height, while behind them rises the Santa Cruz range of mountains. The coast trail, which followed the beach from the southward, here strikes up the hills behind the sand dunes.

Steamers coming upon the coast from the southward in thick weather, always endeavor to make the land near Point Año Nuevo, and then follow the coast to the San Francisco bar. On account of its importance in this respect a light-house was recommended by the Superintendent of the Coast Survey.

A map of the anchorage, with a view of the point, was published by the Coast Survey in 1854.

From Point Año Nuevo the coast runs NW. ¾ N. for about 10 miles, to the rocky point called the *Punta de la Bolsa*, but designated Point Miramontes on the Coast Survey reconnaissance sheet, from Mexico to San Francisco, in 1853. The high mountain square in from La Bolsa, bearing N. 53° E., and distant 13 miles, named Black mountain, attains an elevation of 2,809 feet. Two miles north of La Bolsa empties the Piscador, a small stream running through a valley of inconsiderable extent. For the foregoing 12 miles the general formation of the immediate seaboard is that of a table land of three terraces, the lowest gradually sloping from the base of the second to the coast, which is exceedingly rocky and forbidding; the underlying stratum is sandstone.

From Point Año Nuevo to Pillar Point, or Punta de Corral Tierra, forming the south and western point of Half-moon bay, the general direction is NW. by N. ¼ N., and the distance 25 miles. Three and a third miles above the Piscador opens the San Gregorio, another small stream, and 2⅓ miles still further opens the Tunitas. The seaboard between the valley of the Piscador and that of the San Gregorio undergo is a striking change both in the character of its topography and its geology. Instead of the table land we meet with a spur of the coast mountains running into the sea, and having an elevation of 600 feet within a mile of it. The shore-line and the coast generally presents a very broken and rugged appearance, occasioned by the deep gulches cut through to the ocean.

HALF-MOON BAY.

This anchorage is six miles S.SE. from Point San Pedro, and 18 miles S. by E. from the Golden Gate. The southwestern point of the bay is formed by a bluff table land about 160 feet in height, called the Corral

de Tierra, 325 yards south of which stretches a number of black rocks, which show as one when seen coming up the coast, but as three or four when approached from the northwest. The largest is nearly as high as the bluff, and locally known as Sail rock, or Pillar rock. The point is known as *Pillar Point*, and from its southeastern extremity rocky and foul-bottom, marked by kelp, extends SE. ⅛ E., seven-eighths of a mile, dropping suddenly from 14 feet to 5 fathoms. This is the inner reef, and makes the bay available as a summer anchorage. One mile and three-quarters southeast from the same part of the point a narrow ledge of rocky bottom, one-third of a mile long, and marked by kelp, stretches in the same general direction. The passage between this outer and the inner reef is three-quarters of a mile wide, with rocky and uneven bottom, from 3¼ to 10¼ fathoms. These ledges lie parallel with the coast mountains, and with the shore-line from which the outer one is distant 1⅜ mile. From the eastern extremity of the point the shore runs NW. by N. for a quarter of a mile; then NE. for three quarters of a mile, curving to the eastward and southeastward in a long bend, for 2½ miles to the mouth of the Arroyo de los Pillarcitos, down which comes the only road crossing the peninsula of San Francisco, between the Laguna de Mercedes and Santa Cruz. The highest part of this road, which crosses a depression of the peninsula, is near the Coast Survey station "Ridge," which is 1,093 feet above the ocean, and but a few feet higher than the road. The outer reef is nearly abreast of the Pillarcitos, from which the coast runs south four miles to *Miramontes point*, which is S. 48° E., five miles from Pillar Point; thence to the mouth of the Tunitas the distance is four miles SE. The greatest extent of the bay may be said to be between Pillar and Miramontes Points, but the part near the former only is available.

The soundings between the rocky ledges and the shore are quite regular, decreasing from nine fathoms to three fathoms at less than a quarter of a mile from the beach, with sandy bottom. The passage to the anchorage is between the inner and outer reef, with the high, bare-topped mountain bearing a little north of east, and Pillar Point open to the westward. This mountain is steep, with straggling redwoods on its flanks, and the summit bare. It is locally known as Bald Pate; but, on the Spanish grants, as Cumbra de las Auras. When inside the reefs beat up until Pillar Point bears about SW., distant half a mile, and anchor in 4½ fathoms, hard sand. With southerly light winds a heavy swell sets in; but upon the approach of heavy southeast weather it is necessary to go to sea.

The mass of redwoods cresting the mountains of the peninsula cease abruptly abreast of Miramontes, and only stragglers are seen to the northward. They are a good mark for recognizing this part of the coast when coming in from sea.

Around Half-moon bay is a limited extent of agricultural country at the seaward base of the mountains, and small coasters carry the produce to San Francisco.

About one mile along the coast to the northwestward is a small boat harbor, 100 yards wide, formed and protected by outlying rocks, and having 3½ fathoms in it. In the autumn months it is used as a whaling station. About a thousand barrels of humpback oil were obtained in the fall of 1863.

Point San Pedro lies NW. by N. ¼ N., 30 miles from Point Año Nuevo, and S. 12° E. from Point Lobos, at the entrance to the Golden Gate. It is a black, bold, rocky promontory, over 500 feet high, having a high, large, jagged rock at the northern part, and is a prominent and excellent mark for making the entrance to San Francisco. The principal rock is nearly a hundred feet high. Its south face is white, and shows the line of stratification plainly. From the west the dip of the strata shows about 60 degrees to the northward. It is connected with the main by some low rocks. Half a mile to the northeast of the point is the valley of San Pedro, from which the point takes its name.

From Point San Pedro the bell-boat off the bar of San Francisco is distant 12 miles, and from Point Año Nuevo it is 40 miles upon a NW. by N. course.

The range of mountains forming the northeastern shore of Monterey bay, and extending to Santa Cruz and Point Año Nuevo, is called Santa Cruz. Thence northward to the *Golden Gate*, and forming the peninsula of San Francisco, by bounding the bay on the west, the mountains are known as the San Francisco or San Bruno range.

The extent of shore-line from Point Concepcion to *Point Boneta* is about 286 miles.

BAY OF SAN FRANCISCO AND APPROACHES.

This bay affords the finest and most commodious harbor on the Pacific coast of the United States. From its discovery it has commanded the admiration of navigators, and, since the wonderful rise of California, has well sustained its reputation. Its geographical position, its size and depth of water, its noble entrance

and bold shores, the Sacramento and tributaries, draining the rich agricultural valleys and auriferous slopes of the Sierra Nevada, the magic city upon its shores, and the salubrity of its climate, have conspired to make it emphatically the port of the Pacific.

The Golden Gate is the entrance to the bay, and presents the character of a great cleft or fissure in the sea-coast range of mountains, thereby connecting the bay of San Francisco with the Pacific ocean. On approaching, it is difficult to imagine that a deep channel lies ahead, so clear is the atmosphere, and so well defined the Contra Costa mountains, behind the bay. Both shores are bold, broken into points, and rocky; but the northern is much the bolder, rising almost perpendicularly from the water, attaining an elevation of about 1,000 feet, but a short distance back, and in seven miles rising to 2,600 feet. On the south side, between the points, are stretches of low beach; the hills are undulating and of moderate elevation, increasing very gradually in altitude to the southward, and reaching a height of 1,250 feet in about six or eight miles. The chart of San Francisco entrance, which accompanies the annual Coast Survey Report for 1856, shows the bold and characteristic topography of the vicinity of the Golden Gate.

Point Boneta.—The north head of the entrance is formed by this point; a narrow, precipitous, rocky cape, nearly 300 feet high, and stretching from the light-house about half a mile to the SE. Behind it the mountains rise rapidly to an elevation of 1,500 feet. During the dry season the deposit of sea birds accumulates in such quantities on the ridge outside of Boneta light-house, as to make the bluff show white, but the first heavy rain carries it off, and then, throughout the rainy season, the point exhibits its natural color and appearance. There are no dangers off the point, the line of three fathoms rarely extending 300 yards from any portion of it. When the clipper ship San Francisco was lost on this head, we are told that she first struck the *bluff* inside the heads; was carried by the currents around the point, and then cast ashore on the outside. The reef, or line of sunken rocks, stretching out three-quarters of a mile upon some maps, has no existence, and only serves to mislead those unacquainted with the locality. From five to six fathoms can be found on every side within a fifth of a mile.

One mile and seven-eighths NW. of the point the steamship Tennessee went ashore whilst endeavoring to find the entrance in a thick fog, (calm weather,) and was lost. The Cortes had got in just before her, and as the fog was shutting down over the entrance.

POINT BONETA LIGHT-HOUSE.

The building is situated nearly half a mile from the extremity of the point, and consists of a brick tower painted white, and surmounted by a lantern painted black. From seaward it is seen projected against the dark, high hills behind it, and in clear weather is a very plain object. The illuminating apparatus is of the second order of the system of Fresnel, was first exhibited April 30, 1855, and shows a *fixed light of the natural color* from sunset to sunrise. It illuminates five-sixths of the horizon, and is elevated about 306 feet above the level of the sea. During ordinary conditions of the atmosphere it can be seen from an elevation of—

10 feet at a distance of 23.6 miles.
20 feet at a distance of 25.1 miles.
30 feet at a distance of 26.3 miles.
50 feet at a distance of 28.1 miles.

Its geographical position, as determined by the triangulation of the Coast Survey, is:

	°	′	″	
Latitude	37	49	10.0	north.
Longitude	122	30	50.3	west.
	h.	*m.*	*s*	
Or, in time	8	10	03.4.	

Magnetic variation 15° 27′ east, in 1852, with a present yearly increase of 1′.

From the light at Point Boneta to that on Fort Point the distance is 2⅔ miles, and bearing E. ¼ N.

Fog-bell at Point Boneta.—The bell, with the machinery, is in a frame building, open in front, and placed on the bluff just in advance of the light-house tower, at an elevation of 270 feet above the level of the sea. The bell weighs 1,500 pounds, and during foggy and thick weather is struck six blows, at intervals of sixteen seconds each, followed by a pause of forty-four seconds.

The fog-gun at Point Boneta has been discontinued since the placing of the *bell-boat* outside the bar, March 18, 1858. It may not, however, be amiss to state here the design of the fog-gun. A twenty-four

pounder was placed near the *light-house*, and during fogs or thick weather, either day or night, was fired at the hours and half hours of San Francisco mean time. It enabled vessels, before reaching the bar, to get the bearing of Point Boneta, and, by the loudness of the report, or better, by the soundings, to form an estimate of their distance from it.—(See remarks, page 296, Monterey bay.)

We advocated this plan strongly soon after our arrival upon the coast, and it met with the hearty support and commendation of officers of the navy and commanders of the steamships, clippers, and coasters. Continuing to urge its adoption until the spring of 1855, we had the satisfaction of seeing it tried in August of that year. We have since learned, by British newspapers, that the Board of Trade and Liverpool Corporation have placed a gun of large calibre on Holyhead, to be fired during foggy weather, for the benefit of mail steamers passing up the Irish channel.

Point Lobos.—The south head of the entrance to San Francisco bay is formed by this point, 375 feet high, upon which Congress authorized the erection of a *secondary sea-coast light*, where a light has been regularly shown, and a fog-bell kept in operation by private enterprise. Upon the round-topped hill behind the point is erected a large frame building for a telegraph station, whence the electric wires run to the city of San Francisco. The first telegraphic message transmitted on the Pacific coast was over these wires. Southward of the head the sand dunes are conspicuous and easily recognized features in approaching the entrance. The strong northwest summer winds, drawing in over the land, raise the white sand from the three miles of broad beach, and carrying it inland over the hilltops, bury grass, bushes, and scrub oak. The quantity of sand driven in from this beach is enormous, and its accumulation has greatly modified the topography of the peninsula.

The geographical position of the site selected for the *light-house*, as determined by the triangulation of the Coast Survey, is:

	°	′	″	
Latitude	37	46	56.9	north.
Longitude	122	29	39.5	west.
	h.	*m.*	*s.*	
Or, in time	8	9	58.6.	

This position is 32 feet north and 1,317 feet west of the outer telegraph station.

Off the western face of Point Lobos lie a number of black jagged rocks about 50 feet high, but all within the five-fathom line, and close in shore. They are called the *Seal rocks*, and one of them shows a large arch from particular directions. The outer one bears from Point Boneta SE. by S. $\frac{1}{4}$ S., and is distant $2\frac{1}{8}$ miles. From it the general trend of the shore runs in a line to Fort Point for nearly a mile, to a short jutting high point, off which lie the *Mile rocks*. From this point the shore runs well to the eastward for a mile, gradually trending to the north for a mile and a half to Fort Point. In the deepest part of this bend the shore is low, with small hillocks rising from the general surface and slope of the hills, and fronted by a long sand beach.

Mile rocks.—These two rocks lie off Point Lobos, a short distance within the limit of the entrance of the Golden Gate. They are small, near each other, and have a height of 15 feet above water, with a good depth of water all around and close to them; but the current swirls and eddies about them in such a manner as to render a near approach anything but agreeable or safe with a light wind. The inner and smaller rock is one-third of a mile to the northward of the small jutting point inside of Point Lobos, and very nearly two miles SW. $\frac{1}{2}$ S. from Fort Point. Vessels running in on the line of Fort Point and Alcatraz island pass less than half a mile from the outer and larger rock. The rocks bear almost SE. from Boneta light, and distant $1\frac{7}{8}$ mile. They were called "One Mile Rocks" by Beechy, in November, 1826.

Fort Point.—This was formerly a bold, narrow, jutting promontory of hard serpentine rock, 107 feet above high water, and surmounted by a small Mexican fortification called Fort Blanco. The view from the point was one of the finest in the harbor; but the whole headland has been cut down to within a few feet of high water, and increased in area to form a large fortification, which will be mounted with guns of the largest range and calibre. Upon the hillside rising behind it are houses for the accommodation of the commandant, officers, soldiers, and workmen. Eastward of the point is a long substantial wharf, constructed for receiving stores, ordnance, &c. Several large vessels have been lost on Fort Point by venturing too close during light airs and strong irregular currents.

FORT POINT LIGHT-HOUSE.

This is a wooden building, painted white, and situated outside of the fortifications. The illuminating apparatus is of the fifth order of Fresnel, and shows a *fixed light of the natural color* from sunset to sunrise. It is 52 feet above the level of the sea, and, during ordinary states of the atmosphere, can be seen from an elevation of 15 feet at a distance of 12½ miles. The angle of visibility seaward is bounded by the extremity of Point Boneta, bearing W. ¾ S., and Point Lobos, bearing SW. by S. ¼ S.

The geographical position, as determined by the triangulation of the Coast Survey, is:

	° ′ ″
Latitude	37 48 37.4 north.
Longitude	122 27 37.8 west.
	h m. s.
Or, in time	8 9 50.5.

The light-house first built upon the high point was taken down when the fortification operations commenced. The light in the present one was first exhibited March 21, 1855.

The South Farallon light is visible from a vessel's deck when abreast of Fort Point.

Fog-bell at Fort Point.—The framework supporting the bell is on the eastern side of the light-house, and almost touching it. The crown of the bell is 40½ feet above the surface of the ground, and supported by iron rods, 10 feet above the wooden structure in which it was formerly placed. The bell weighs 1,092 pounds, and during foggy or thick weather is struck by machinery, five blows at intervals of ten seconds, followed by a pause of thirty-four seconds.

BELL-BOAT OUTSIDE OF SAN FRANCISCO BAR.

A bell-boat is placed just outside of the bar, in 15 fathoms at mean low water, on the range of the Fort Point and Alcatraz Island light-houses. It is 30 feet long, painted red, and furnished with a day-mark of 3½ feet by four, elevated eight feet above the water. The bell weighs 500 pounds, is elevated 15 feet above the water, is rung by the action of the sea, and, under ordinary circumstances of wind and sea, should be heard from one to three miles. Mariners are cautioned not to run into or damage this aid to navigation. The fog-gun signal at Point Boneta was discontinued with the placing of this bell-boat, March 18, 1858, as already stated; and the bar buoy on the same range was also removed.

The approximate geographical position of the bell-boat is:

	° ′
Latitude	37 45½ north.
Longitude	122 38½ west.

The bearings and distances of prominent objects from it are as follows:

South Farallon Island light-house, SW. by W. ½ W., 16½ miles.
Punta de Los Reyes, (light-house site,) NW. by W. ⅚ W., 22¼ miles.
Duxbury Point, NW. by N. ½ N., 8½ miles.
Point Boneta light-house, NE. ¼ N., 7¼ miles.
Fort Point light-house, NE. ¾ E., 9¼ miles.
Point Lobos telegraph station, NE. by E. ½ E., 7½ miles.
Point San Pedro, SE. ¼ E., 11½ miles.

The course to enter the bay from it is NE. ¾ E., and it will be seen that it lies almost in the line from the S. Farallon light to the proposed Point Lobos light.

From the bell-boat, Fort Point (two miles inside the south head formed by Point Lobos) is on with Alcatraz island, inside of the harbor. Fort Point and Alcatraz island have harbor lights upon them, and are the fair way line for crossing the bar.

The bell-boat was upset about April 1, 1859, as seen from Table mountain. It was subsequently replaced, and again carried away. When we came out in November, 1860, it was not on the bar.

SAN FRANCISCO BAR.

The bar off the entrance to the bay of San Francisco has a depth of five fathoms at the lowest tides. Its general form is that of a horse-shoe, commencing four miles southward, stretching out gradually to six miles abreast of Point Lobos; and when nearly up to the parallel of Point Boneta, running in shore towards

that point and forming the "four-fathom bank," from a distance of four miles down to one. The average breadth of the bar within the limits of the six-fathom curve is about one mile. It falls off outside to 10 fathoms in half a mile, and deepens gradually inside. Not less than five fathoms exist over the bar when Point Boneta light bears between NE. by E. ½ E., and N. by W. ⅓ W.

No vessel should anchor upon the bar if she can possibly avoid it; frequently a heavy swell sets in without wind, and if the current is running strong ebb, it allows little chance of escaping from an uncomfortable berth.

The flood tide makes on the bar about 61 minutes earlier than at San Francisco.

It has been given as a rule for steamers approaching in thick weather to run for the bar as nearly as they can estimate, keeping the lead going until they strike five fathoms, and run on until the depth is increased, when the armed lead should bring up gray sand with red specks, and they may conclude themselves within the bar. Recently it has been intimated that these peculiarities of bottom exist also outside of the bar.

A line of large buoys, properly marked, outside the bar in 10 fathoms is the next best expedient after a large fog-gun. From them the position of the bell-boat could be known; and numbered buoys from it across the bar would enable steamers in thick weather to feel their way in, and be independent of guessing about the velocity and direction of the current.

The fog sometimes stands like a wall outside of a line from Fort Point across the entrance, while the bay inside is beautifully clear. After the greatest heat of the day is passed this fog creeps in and envelopes land and water.

Buoy on the four-fathom bank.—A first class can buoy, with red and black horizontal stripes, is placed in four fathoms at mean low water near the western and seaward end of the "four-fathom bank," lying off Point Boneta. The following bearings and distances will give its position:

It is on the prolongation of the line from Fort Point light to the extreme point of Boneta.

Point Boneta light bears E. 13° N., distant 3½ miles.

Outer telegraph station on Point Lobos bears E. 13° S., distant 5¼ miles.

The highest part of the western ridge of Table mountain bears N. 13° W.

There is a spot having but 3¾ fathoms upon it outside this buoy, bearing S. 34° W. and distant seven-eighths of a mile.

The shores of the Golden Gate.—On the north side of the Golden Gate the shores are very precipitous, with an occasional short stretch of sand beach at the base of the bluffs, affording a boat landing. *Point Diablo* is the first point inside Boneta, and bears NE. by E. ⅜ E., distant 1½ mile from it; between these the shore is indented about three-quarters of a mile, affording a boat landing during smooth weather for the light-house people. In the vicinity of Diablo the faces of the cliffs show of a reddish purple color. The rock is very hard and flinty, "traversed by seams of quartz, and has a banded or belted structure, so that it resembles varieties of jasper. * * * * * It exhibits its stratified character most distinctly. It is also found at the cinnabar mine of New Almaden."

The red specks found on the bar are doubtless derived from the disintegration of these reddish cliffs.

From Diablo the shore is jagged and irregular to *Lime Point Bluff*, 495 feet high, distant one mile, and bearing NE. ¾ E. Off this point are several high rocks, but they are so close to the bluff as to be distinguishable only from certain directions. From Lime Point Bluff to Fort Point the distance is barely a mile, and the bearing S. by E. ¾ E. This is the narrowest part of the Golden Gate. Thence the bay begins to open well to the northeast.

On the south side, eastward from Fort Point, the shore is low, flat, and marshy to *Point San José*, distant 2½ miles, and bearing E. by N. This point is moderately high, with a few houses clustering upon it, and is locally known as Black point. Off this reach was the "outer anchorage" of former navigators, and the Presidio of San Francisco is seen a short distance behind it.

"It is a curious and interesting fact that the sand beach between Fort Point and Point San Josef has been thrown up by the surf upon an extensive alluvial deposit, which has the character of a peat bog or swamp. When the tide is very low the edge of this peat formation may be seen. Large masses of the peat are also broken out during storms, and thrown up on the sand of the beach. This sand and all the loose round boulders, from three to eight inches, or more, in diameter, rest upon a foundation of the peat; and the continuation of the peat is found in the swamp or flat meadow land which lies inside the belt of sand, and between it and the base of the sandstone hills. It is very difficult to account for the formation of this swamp under conditions like those at present existing."

"A strong current is constantly setting back and forth through the channel, and the action of the surf constantly undermines and encroaches upon the beach, so that the present action is destructive, and the swamp could not possibly have been formed while the Golden Gate was open as we now find it." These remarks are taken from a geological report of the coast of California, by W. P. Blake, esq.—(See Coast Survey Report for 1855, page 389.)

From Point San José to North Point, at the base of *Telegraph hill*, the distance is one mile, and the bearing E. $\frac{3}{4}$ N. All this space forms part of the city of San Francisco, and is covered with houses. The shore-line is denominated the *North beach*, and from about the middle of the lowest part projects a long wharf over the flats to three fathoms water. This has naturally caused a great deposit around it, and now only $4\frac{1}{2}$ feet of water can be obtained at the northwest part of the wharf at mean low water.

Telegraph hill rises to a height of 301 feet above the mean level of the bay, and is covered with houses to its summit wherever building room can be obtained. The present plan of the city grades contemplates the entire removal of this hill.

The geographical position of the triangulation station of the Coast Survey, upon its summit, is:

	° ′ ″
Latitude	37 48 00.1 north.
Longitude	122 23 19.4 west.
	h. m. s.
Or, in time	8 9 33.3.

Upon this hill was formerly erected a telegraph or semaphore, by which intelligence of the arrival of vessels off the Golden Gate was made known to the city—hence the name of the hill.

ALCATRAZ ISLAND AND LIGHT.

This is the first island that is opened in entering the Golden Gate, and upon it is erected a light-house. The island is nearly 600 yards long, in a W.NW. direction, by about 260 in width, and rises to an elevation of 135 feet above high water. The summit is flat, falling away gently on all sides for some distance, and then at the sides dropping perpendicularly. Upon the top exists a thin layer of earth, but the island is composed of a fine-grained and "very compact sandstone of a dark bluish green color. It is regularly stratified in beds of varying thickness, and often separated by thin layers of argillaceous shale. It appears to contain a large amount of protoxide of iron, which changes to the hydrous sesquioxide on exposure." Deep water marks exist all round the island, and, with the exception of one or two places, the sides are so steep that a landing is effected with difficulty. Extensive fortifications are now in course of construction upon it. At the SE. side a small pier has been built to receive stores, ordnance, and materials. Off the NW. part, foul bottom makes out about 300 or 400 yards.

Alcatraz Island light-house is built on the summit of the island, and bears NW. from Telegraph hill, distant $1\frac{2}{3}$ mile; from Fort Point NE. $\frac{3}{4}$ E., distance $2\frac{5}{6}$ miles.

The light is a *fixed harbor light of the natural color*, and of the third order of Fresnel, illuminating the entire horizon, and exhibited from sunset to sunrise. It is 160 feet above the level of the sea, and should be seen from the sea, under ordinary states of the atmosphere, at a distance of 14 miles, or outside the bell-boat off the bar.

Its geographical position, as determined by the Coast Survey, is:

	° ′ ″
Latitude	37 49 26.6 north.
Longitude	122 24 18.8 west.
	h. m. s.
Or, in time	8 9 37.3.

Fog-bell on Alcatraz island.—The framework supporting the bell is built on the southeastern extremity of the island, close to the water's edge, and is elevated about 30 feet above the water. The bell weighs 1,092 pounds, and, during foggy or thick weather, is struck by machinery four blows at intervals of eight seconds, followed by a pause of fifteen seconds.

Alcatraz is the Spanish name of the island; Beechy erroneously calls it Alcatrasses; the local name is Bird island.

No hidden dangers have been discovered in the entrance outside of the line from Fort Point to Lime Point Bluff, but there are several inside.

Presidio shoal, having $3\frac{1}{2}$ fathoms upon it, lies $1\frac{1}{8}$ mile inside of Fort Point, and bears NE. by E. $\frac{1}{4}$ E. from it, or three-quarters of a point eastward of the line between the lights on Fort Point and Alcatraz island. The shoal is about 700 yards long within the four-fathom curve, and over half a mile long within the five-fathom curve. It is very narrow, shows sandy bottom, and has deep water all around it. Its general direction is on the above mentioned bearing.

From the shoalest part the Presidio flag-staff bears S. $\frac{1}{2}$ E., and we have ventured to distinguish the shoal by that name.

Anita rock shows above water at low tides, and is situated $1\frac{1}{6}$ mile inside of Fort Point, and bears E. by N. from it. It is only 300 yards from the low beach, and has deep water close around it.

"A spar buoy, painted red, with even numbers, has been placed in three-fathoms water, about half a cable's length due west from the shoalest part of Anita rock. Vessels should not approach this buoy within a cable's length, as a strong current sets across the rock." It was named after the United States quarter-master's barque Anita that struck upon it.

Bird or Arch rock is a small pyramidal rock, about 45 feet in diameter, 30 feet high, and bearing W. $\frac{3}{4}$ S., distant seven-eighths of a mile from the light-house on Alcatraz island. When seen in the direction from or towards the Presidio shoal, it presents a perforation at low tides.

Shag rock is a low white-topped rock, about half a mile nearly N.NE. from Bird rock. From Alcatraz light it bears W. by N., distant one mile. For about 300 yards towards Alcatraz island the bottom is foul and irregular, but outside that limit 10 fathoms are found. The rock shows about four feet above the highest tides, being then not more than 8 or 10 feet in extent.

Wreck.—The wreck of the "Flying Dragon," sunk early in 1862, inside the Golden Gate, has been found in the track of vessels passing close to or between Bird and Shag rocks. There is plenty of water around this obstruction.

From it the following bearings are given to determine its position:

Shag rock, N. 14° E., distant 670 yards.

Bird rock, S. 88° E., distant 330 yards.

Bird rock is on with the highest point of Yerba Buena island from the wreck.

Blossom rock is a ledge having five feet water upon it at the lowest tides, and, within the three-fathom curve, is about 300 by 200 yards in extent, with deep water outside these limits. A spar buoy, painted with red and black horizontal stripes, has been placed in four fathoms water, about half a cable's length due south from the shoalest part of the ledge. Vessels should not approach this buoy from any direction nearer than a cable's length. In the winter of 1863–'64 it was torn from its moorings during a heavy norther.

This ledge bears E. by S. from Alcatraz light, and $1\frac{1}{8}$ mile distant, being almost on the line joining the south points of Alcatraz and Yerba Buena islands. From the summit of Telegraph hill it bears N. 6° W., distant one mile.

It was discovered and named by Beechy, after his ship, in November, 1826.

Yerba Buena island is the large high island opened to the east and south of Alcatraz after entering the Golden Gate. The western point of this island is $1\frac{3}{4}$ mile from Telegraph hill, and the bearing NE. by E. Its peak is 343 feet high; the sides steep and irregular, and rising to a ridge running nearly east and west. On the western or San Francisco side the water is very deep close in shore, but from the NW. point a three-fathom bank extends $1\frac{1}{4}$ mile NW. by N., spreading to the eastward for half a mile, and thence running to the NE. point. The wreck of the ship Crown Princess lies in five fathoms on the western edge of this bank, and a day-mark, painted red, has been attached to her, consisting of a plank seven inches by three, 30 feet long, showing 15 feet above high water, with a board five feet long, nailed across just below the top. The following bearings and distances give its position:

Alcatraz Island light-house, W. by S., $2\frac{1}{4}$ miles.

Telegraph hill, SW. by S., $1\frac{7}{8}$ mile.

West end of Yerba Buena island, SE. by S. $\frac{1}{8}$ S., $\frac{3}{4}$ mile.

East end of Yerba Buena island, E. by S. $\frac{1}{4}$ S., one mile.

In early times this island is said to have been densely covered with wood, and was known to navigators and whalers as Wood island. Now it has but a few scrubby trees. In 1839 a large number of goats was placed upon it, and it received the still popular name of Goat island. On a recent map of California (1858) it is called Ghote island.

Angel island.—When passing through the narrowest part of the Golden Gate this large island bears about N.NE., and is seen as an island for a very short time when in the narrowest part of the Golden Gate. It has an irregular and bold shore-line of about five miles, and an area of one square mile. It rises to a height of 771 feet, is covered with grass and bushes, and cut in every direction by deep gulleys. As seen from the southeastward it appears part of the northern peninsula, but is divided from that on its NW. face by Raccoon straits, three-quarters of a mile in width, having a depth of water ranging from 10 to 30 fathoms, and a very strong current. A narrow high jutting point makes out from the SE. portion of the island, bearing N. $\frac{3}{4}$ W. from Alcatraz Island light, and distant $1\frac{5}{8}$ mile. From this head the general trend of the southern face for over a mile is W. by S. toward Saucelito Point.

Punta de los Cavallos is half a mile N.NW. from Lime Point bluff. The shore-line between them falls slightly back, and a very small valley makes down from the high hills behind.

Point Saucelito.—From Point Cavallos the general trend of the shore is NW. by N. for $1\frac{1}{2}$ mile to Point Saucelito, with nearly a straight shore-line. One mile from Point Cavallos is the anchorage of Saucelito, where men-of-war and whalers formerly anchored. It lies abreast of a few houses forming the town of Saucelito, whence much of the water used in San Francisco was formerly taken in steam water-boats. North of this anchorage is a large bay, with but a few feet of water. From Saucelito Point to the western point of Angel island the distance is $1\frac{3}{4}$ mile, and the bearing NE. by E $\frac{1}{2}$ E.

To Peninsula Point, forming the southwestern part of Raccoon straight, the distance is one mile, and bearing NE. $\frac{2}{3}$ E.

The following list of geographical positions in San Francisco bay is taken from the published reports of the United States Coast Survey:

"*Outer telegraph station,*" on the summit of the hill behind Point Lobos.

	°	′	″	
Latitude	37	46	50.2	north.
Longitude	122	29	23.3	west.
	h.	*m.*	*s.*	
Or, in time	8	09	57.5.	

"*Presidio,*" near the Presidio of San Francisco. Primary astronomical station.

	°	′	″	
Latitude	37	47	29.8	north.
Longitude	122	26	15.0	west.
	h.	*m.*	*s.*	
Or, in time	8	09	45.0.	

Magnetic variation, 15° 27′ east in February, 1852; yearly increase, 1′.

Telegraph hill, near the San Francisco observatory. Primary astronomical station.

	°	′	″	
Latitude	37	47	52.8	north.
Longitude	122	23	10	west.
	h.	*m.*	*s.*	
Or, in time	8	09	32.5.	

The highest part of the hill is 301 feet above the mean level of the bay.

Rincon, summit of the slight hill NE. of South Park. Secondary astronomical station.

	°	′	″	
Latitude	37	47	00.6	north.
Longitude	122	22	32	west.
	h.	*m.*	*s.*	
Or, in time	8	09	30.1.	

SAILING DIRECTIONS FOR APPROACHING AND ENTERING SAN FRANCISCO BAY.

In approaching the coast every opportunity should be seized for determining the vessel's position, as fogs and thick weather prevail near the land. Vessels coming from the *southward* make the coast about Point Año Nuevo, (lat. 37° 07′ N.,) and follow it at a distance of four or five miles up to the bar. Steamers keep close under the land for fear of losing it in foggy weather. Coming from the *westward* they first sight the South Farallon island, (latitude 37° 42′ N.,) having the light-house upon it, and keep upon either side of it; but it is preferable to go to the southward, especially in thick weather and at night, as the vicinity of

the island has not yet been surveyed in detail. From the South Farrallon light-house the Point Boneta light bears NE. by E., 23⅔ miles; and the bell-boat outside the bar bears NE. by E. ½ E., 16½ miles. Coming from the northwestward they make Punta de los Reyes, 597 feet high, in latitude 38° 00′ N., longitude 123° 00′ W., and pass within two or three miles of it, 15 fathoms being found within a quarter of a mile from it, but vessels are apt to lose the wind by getting too close under it. From the western extremity of this point the Point Boneta light bears E. ¾ S., distant 25¾ miles, the line passing over the tail of Duxbury reef, at a distance of 17¼ miles from Los Reyes. To the bell-boat off the bar the bearing is SE. by E. ⅚ E., and distance 22¼ miles.

The bell-boat, 1½ mile outside of the bar, is placed on the prolongation of the range from Alcatraz island to Fort Point, giving a course NE. ¾ E. for vessels entering the Golden Gate, and designated by Belcher the "fair way line," and he calls the island and fort the "fair way marks." But with a heavy swell on the bar this range should be used merely as a line of reference, because on the bar it passes over a small five-fathom spot, while half a fathom more can be obtained for a distance of two miles both north and south of it. In clear weather and with a favorable wind a vessel can cross the bar in not less than five fathoms from the line, having the north end of Alcatraz island just open by Point Boneta, (NE. by E. ¾ E.,) round to the shore south of Point Lobos, (N. by W. ⅓ W.) Northward of the former line the four-fathom bank (having 3¾ fathoms on it) commences one mile west of Boneta, and stretches out over three miles, with a breadth of one mile. Upon this bank the clipper Golden Fleece struck in 1857, and came into port with seven or eight feet of water in her hold. She was the second of her name that was unfortunate in entering the harbor, the first having been totally lost on Fort Point.

Between the eastern extremity of the "four-fathom bank" and the shore, the distance is seven-eighths of a mile, and within this space can be found the deepest water for entering the harbor, but it would be dangerous for a sailing vessel to attempt it with a flood tide and light winds. While it is breaking on the bank only a heavy swell is found through this 8½-fathom channel, and small sailboats have passed in safety when they dared not try the bar. We entered by it in the brig Wyandot, in June, 1854, and the steamship Columbia frequently used it in leaving the harbor for the upper coast when the heavy weather on the bar would otherwise have delayed her in port. Close in under the cliffs, two or three miles above Boneta, we anchored in eight fathoms, with muddy bottom.

During clear, moderate weather any vessel can cross the bar, within the limits we have mentioned, without running until she has got on the "fair way line," whereby she might lose her slant of wind. Should the wind fail, or be light, and the current adverse, anchor outside the bar in 15 fathoms, mud and fine sand; or, after crossing the bar, in 6 to 10 fathoms, fine grey sand, with red specks in some places. Run in mid-channel between the heads; avoid too close proximity to the northern shore, not only in entering, but in leaving; the high, bold bluffs causing calms and baffling airs, even with a southeaster blowing out. On the last of January, 1864, during a southeaster, three vessels were at one time becalmed under the northern shore, and baffled with variable airs and strong current eddies for several hours. One of them, the barkentine Jenny Ford, was carried on Point Diablo and totally wrecked. Between Fort Point and the opposite shore, take special care not to approach Fort Point too close, because the currents set around it irregularly and with great rapidity, and the bottom is uneven and rocky. A depth of 69 fathoms is given in the centre of the channel. In the Golden Gate we have measured an ebb current running about six miles per hour. As a general rule, the winds increase within the heads, drawing in very strongly abreast of Fort Point. When off this point steer for Alcatraz light-house until the north point of Telegraph hill bears E. by S., then steer to give it a berth of a quarter of a mile, running through among the shipping.

In making the port at night it is customary to run for the bell-boat, and cross the bar with Fort Point light on with Alcatraz island light, or better, the latter a little open to the northward. But this practice frequently involves much delay and annoyance when the wind will not permit a vessel to attain this position without a tack. With Boneta light bearing from N. by W. to NE. by E. a vessel may boldly run on within those limits, and, unless there be a heavy swell, safely cross the four-fathom bank. Give Boneta a berth of a mile, and when within the heads, and Boneta abeam, gradually open Alcatraz light north of Fort Point, until abeam of the latter; then run for Alcatraz until the lights of the shipping show the vessel's position. Hauling up for them, anchor off the north beach in 10 fathoms, or off the northeast front of the city in 10 fathoms, soft mud.

In coming upon the coast in thick foggy weather, sailing vessels should not run into less than 50 fathoms because the water around the South Farallon, and off Point San Pedro and Punta de los Reyes, is very

bold. It is believed, however, that a 30-fathom bank exists at a considerable distance to the westward of the last. Southwest of the line passing through the Farallones and Noonday rock, the 100-fathom curve is only four miles distant, and the 50-fathom curve only two miles, with a very irregular bottom. If the Farallones be made, a course can be easily laid for the bar, but it would be unadvisable to run into less than 10 fathoms, soft mud, if the bell-boat be not heard, as the set and strength of the currents off the bay are yet undetermined. Belcher says that, being caught in a fog, he anchored in 15 fathoms, to the southward of the bar, and determined "that southerly of the fair way line the ebb tide set N.NE., flood S.SW." We suppose he means from the N.NE., and from the S.SW. During the season of freshets in the Sacramento and tributaries the discolored water outside the bar will frequently point out the position of the entrance.

Steamers in thick weather were accustomed to run close along the coast, and endeavored to make the land north of Point San Pedro, running in until they got about 15 fathoms, and then laying a course for the bar, shoaling upon it to about five fathoms, and then gradually deepening, while the fog-gun gave the direction of Boneta light. Before the establishment of the fog-gun the steamship "Tennessee" was wrecked two miles north of Boneta, when seeking for the entrance in a dense fog; the steamship S. S. Lewis, just north of Duxbury reef; and the U. S. revenue brig Lawrence, between points Lobos and San Pedro. Steamers and clippers are afraid to approach the bar in thick weather. We have entered in a dense fog without hearing the bell, and the general opinion is that it is ineffective.

As it has been frequently stated that Beechy did not intend to adopt the range, Fort Point and Alcatraz island as a fair way over the bar to the entrance, we here quote his directions, as published under authority of the Lords of the Admiralty. "In crossing the bar it is well to give the northern shore a good berth, and bring the small white island, Alcatrasses, in one with the fort or south bluff, if it can be conveniently done, as they may then insure six fathoms; but if ships get to the northward so as to bring the south bluff in one with the island of Yerba Buena, they will find but 4¼; * * * * to the northward of this bearing the water is more shallow."

"Approaching the entrance, the island of Alcatrasses may be opened with the fort, and the best directions are to keep mid-channel, or the *weather side*."

In his narrative he says: "The best part for crossing is with the island of Alcatrasses in one with the fort."—(Vol. 1, page 345.) When approaching the harbor he steered directly into it, and in crossing the bar the depth of water gradually diminished to five fathoms; "this would have been of no consequence had it not been for a swell which rolled so heavily over the bank that it continually broke; and, though our depth of water was never less than 4½ fathoms, the ship on two or three occasions disturbed the sand with her keel. The tide was, unfortunately, against us, and the swell propelled the ship just sufficiently fast for her to steer without gaining any ground, so that we remained in this position several hours."—(Vol. 1, page 345.)

The U. S. sloop-of-war Vincennes, during the cruise of the Exploring Expedition, anchored on the bar in a calm, and, when the flood tide made it brought up a swell that broke over her.

In beating out, vessels start on the last quarter of the flood, make the first tack to the northward of the Blossom rock, and weather it on the second; thence they keep between Alcatraz and the south shore, avoiding Bird rock, one mile west of the south end of the island, and giving a good berth to Fort Point, past which the ebb current will carry them rapidly, (with a strong tendency towards the south shore,) and a couple more tacks carry them clear of the heads. If the vessel be bound to the northward, and the weather shut in thick, with the wind to the northwest, she makes a tack off shore to the southward of the Farallones if the weather be clear short tacks are made off shore until she works up to Los Reyes, because the sea to the leeward of that headland is much smoother and the current less; then stands off until a course can be made for her port.

The winds.—It has been advised to work close along shore to northern ports during the summer northwest winds, and take the chances of land breezes to make latitude, but the attempt will double the length of any voyage. Baffling light airs and calms frequently exist along the coast, while vessels several hundred miles off have strong NW. winds. Moreover, along the coast we know that the current frequently sets two miles per hour from the northward, except very close under the shores. In our experience we never yet have met a wind off the land north of San Francisco, and very rarely, indeed, south of it, except in the region of the Santa Barbara channel. As a general rule, it may be safely stated that the summer winds follow the line of the coast, nearly, and gradually draw towards and over the land In winter, with wind from the southward, this is not so marked.

From April to October, inclusive, the prevailing wind is from the northwest, changing to west in valleys opening upon the coast, but in no case so strongly as through the Golden Gate. During the summer the wind sets in strong about 10 a. m., increasing until nearly sunset, when it begins to die away. During its height it almost regularly brings in a dense fog, which, working its way over the peninsula, meets that already advanced through the Golden Gate, and envelopes San Francisco and the bay by sunset. As a rule, the breeze does not dispel the fog. If a fog exists outside, the wind is sure to bring it in, but the heated earth dissipates it for a time.

From November to March the wind is frequently from the southeast, blowing heavily, working round to the southwest, with a large and broken swell from the SW., weather thick, rainy, and squally; the wind not unfrequently ending at NW., with an ugly cross sea. During heavy southeasters the sea breaks upon the San Francisco bar, clean across the entrance, presenting a fearful sight. The sound can be heard at the anchorage in front of the city.

During some winters a hard "norther" will spring up and blow steadily and strongly from one to five days, with a clear blue sky, and cold bracing weather. Winds rarely blow from points between north, round by the east, to southeast.

The further north we advance, the heavier blow the gales in the winter. The northwest winds are not predicted by the barometer, but, from the southeast, almost invariably; the mercury falling one inch from its usual height of about thirty inches. When it begins to rise, the wind may be looked upon as soon to shift round by the west, and to decrease. Only in one instance during our experience has this failed, and that was off the Strait of Juan de Fuca.

On the tops of the mountains bordering the coast, light variable and easterly airs are frequently experienced whilst the northwest winds are blowing freshly along the seaboard. Upon Sulphur Peak, in latitude 38° 46′, and 26 miles from the coast, we have had fresh breezes from the E.NE., whilst the usual northwest winds were prevailing off shore. On Ross mountain, only three miles from the sea, and rising 2,197 feet from the right bank of the Slavianska river, we found variable airs when strong summer winds were blowing below.

TIDES AT SAN FRANCISCO.

As a general rule, there are upon the Pacific coast of the United States one large and one small tide during each day, the heights of two successive high waters—occurring one, a. m., and the other, p. m. of the same twenty-four hours—and the intervals from the next preceding transit of the moon are very different, so much so that at certain periods a rock which has 3½ feet upon it at low tide may be awash on the next succeeding low water.

These inequalities depend upon the moon's declination. They disappear near the time of the moon's declination being nothing, and are greatest about the time of its being greatest. The inequalities for low water are not the same as for high, though they disappear and have the greatest value at nearly the same times.

When the moon's declination is north, the higher of the two high tides of the twenty-four hours occurs at San Francisco about eleven and a half hours after the moon's transit; and when the declination is south, the lower of the two high tides occurs at about that interval. The lower of the two low waters of the day is the one which follows next the higher high water.

The corrected establishment, or mean interval between the moon's transit and the time of high water at San Francisco, is XII*h*. VI*m*. The mean rise and fall of tides is 3.6 feet; of spring tides, 4.3 feet; and of neap tides, 2.8 feet. The mean duration of the flood is 6*h*. 39*m*.; of the ebb, 5*h*. 51*m*.; and of the stand, 34*m*. The average difference between the corrected establishment of the a. m. and p. m. tides of the same day is 1*h*. 28*m*. for high water, and 0*h*. 38*m*. for low water. The differences when the moon's declination is greatest are 2*h*. 30*m*. and 0*h*. 48*m*. The average difference in height of these two tides is 1.1 foot for the high waters, and 2.2 feet for the low waters. When the moon's declination is greatest those differences are 1.5 foot and 3.7 feet, respectively. The average difference of the higher high and lower low waters of the same day is 5.2 feet, and when the moon's declination is greatest, 6.1 feet. The higher high tide in the twenty-four hours occurs about 11*h*. 22*m*. after the moon's upper transit, (southing,) when the moon's declination is north, and about 1*h*. 2*m*. before, when south. The lower of the low waters, about 7*h*. after the higher high tide. The greatest observed difference between the two low waters of one day was 5.3 feet, and the greatest difference between the higher high and lower low waters of one day was 8.5 feet.

The following tables will give the times and heights of high and low waters at San Francisco. Similar tables will be found at the end of the directory for San Diego, Astoria, and Port Townshend.

Tables I and II give the number to be added to the time of moon's transit to find the time of high water. It is one of double entry, the time of transit being placed in the first column, and the number of days from the day at which the moon had the greatest declination being arranged at the top of the table. Entering the first column with the time of transit, and following the line horizontally until we come under the column containing the days from the greatest declination, we find the number to be added to the time of transit to give the time of high water. If the moon's declination is south, Table I is to be used; if north, Table II.

TABLES FOR SAN FRANCISCO.

Table I.

Time of moon's transit.	SOUTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
0 0	11 43	11 59	12 15	12 33	12 50	13 03	13 17	13 20	13 19	13 14	13 07	12 57	12 45	12 32	12 18
0 30	11 37	11 53	12 09	12 27	12 44	12 57	13 11	13 14	13 13	13 08	13 01	12 51	12 39	12 26	12 12
1 0	11 31	11 47	12 03	12 21	12 38	12 51	13 05	13 08	13 07	13 02	12 55	12 45	12 33	12 20	12 06
1 30	11 25	11 41	11 57	12 15	12 32	12 45	12 59	13 02	13 01	12 56	12 49	12 39	12 27	12 14	12 00
2 0	11 19	11 35	11 51	12 09	12 26	12 39	12 53	12 56	12 55	12 50	12 43	12 33	12 21	12 08	11 54
2 30	11 14	11 30	11 46	12 04	12 21	12 34	12 48	12 51	12 50	12 45	12 38	12 28	12 16	12 03	11 49
3 0	11 11	11 27	11 43	12 01	12 18	12 31	12 45	12 48	12 47	12 42	12 35	12 25	12 13	12 00	11 46
3 30	11 11	11 27	11 43	12 01	12 18	12 31	12 45	12 48	12 47	12 42	12 35	12 25	12 13	12 00	11 46
4 0	11 16	11 32	11 48	12 06	12 23	12 35	12 50	12 53	12 52	12 47	12 40	12 30	12 18	12 05	11 51
4 30	11 24	11 40	11 56	12 14	12 31	12 41	12 58	13 01	13 00	12 55	12 48	12 38	12 26	12 13	11 59
5 0	11 33	11 49	12 05	12 23	12 40	12 53	13 07	13 10	13 09	13 04	12 57	12 47	12 35	12 22	12 08
5 30	11 41	11 57	12 13	12 31	12 48	13 01	13 15	13 18	13 17	13 12	13 05	12 55	12 43	12 30	12 16
6 0	11 49	12 05	12 21	12 39	12 56	13 09	13 23	13 26	13 25	13 20	13 13	13 03	12 51	12 38	12 24
6 30	11 54	12 10	12 26	12 44	13 01	13 14	13 28	13 31	13 30	13 25	13 18	13 08	12 56	12 43	12 29
7 0	12 01	12 17	12 33	12 51	13 08	13 21	13 35	13 38	13 37	13 32	13 25	13 15	13 03	12 50	12 36
7 30	12 07	12 23	12 39	12 57	13 14	13 27	13 41	13 44	13 43	13 38	13 31	13 21	13 09	12 56	12 42
8 0	12 12	12 28	12 44	13 02	13 19	13 32	13 46	13 49	13 48	13 43	13 36	13 26	13 14	13 01	12 47
8 30	12 15	12 31	12 47	13 05	13 22	13 35	13 49	13 52	13 51	13 46	13 39	13 29	13 17	13 04	12 50
9 0	12 14	12 30	12 46	13 04	13 21	13 34	13 48	13 57	13 50	13 45	13 38	13 28	13 16	13 03	12 49
9 30	12 12	12 28	12 44	13 02	13 19	13 32	13 46	13 49	13 48	13 43	13 36	13 26	13 14	13 01	12 47
10 0	12 08	12 24	12 40	12 58	13 15	13 28	13 42	13 45	13 44	13 39	13 32	13 22	13 10	12 57	12 43
10 30	12 02	12 18	12 34	12 52	13 09	13 22	13 36	13 39	13 38	13 33	13 26	13 16	13 04	12 51	12 37
11 0	11 55	12 11	12 27	12 45	13 02	13 15	13 29	13 32	13 31	13 26	13 19	13 09	12 57	12 44	12 30
11 30	11 47	12 03	12 19	12 37	12 54	13 07	13 21	13 24	13 23	13 18	13 11	13 01	12 49	12 36	12 22

TABLE II.

Time of moon's transit.	NORTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—							After—							
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
h. m.	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*	*h. m.*
0 0	12 27	12 11	11 55	11 37	11 20	11 07	10 53	10 50	10 51	10 56	11 03	11 13	11 25	11 38	11 52
0 30	12 21	12 05	11 49	11 31	11 14	11 01	10 47	10 44	10 45	10 50	10 57	11 07	11 19	11 32	11 46
1 0	12 15	11 59	11 43	11 25	11 08	10 55	10 41	10 38	10 39	10 44	10 51	11 01	11 13	11 26	11 40
1 30	12 09	11 53	11 37	11 19	11 02	10 49	10 35	10 32	10 33	10 38	10 45	10 55	11 07	11 20	11 34
2 0	12 03	11 47	11 31	11 13	10 56	10 43	10 29	10 26	10 27	10 32	10 39	10 49	11 01	11 14	11 28
2 30	11 58	11 42	11 26	11 08	10 51	10 38	10 24	10 21	10 22	10 27	10 34	10 44	10 56	11 09	11 23
3 0	11 55	11 39	11 23	11 05	10 48	10 35	10 21	10 18	10 19	10 24	10 31	10 41	10 53	11 06	11 20
3 30	11 55	11 39	11 23	11 05	10 48	10 35	10 21	10 18	10 19	10 24	10 31	10 41	10 53	11 06	11 20
4 0	12 00	11 44	11 28	11 10	10 53	10 40	10 26	10 23	10 24	10 29	10 36	10 46	10 58	11 11	11 25
4 30	12 08	11 52	11 36	11 18	11 01	10 48	10 34	10 31	10 32	10 37	10 44	10 54	11 06	11 19	11 33
5 0	12 17	12 01	11 45	11 27	11 10	10 57	10 43	10 40	10 41	10 46	10 53	11 03	11 15	11 28	11 42
5 30	12 25	12 09	11 53	11 35	11 18	11 05	10 51	10 48	10 49	10 54	11 01	11 11	11 23	11 36	11 50
6 0	12 33	12 17	12 01	11 43	11 26	11 13	10 59	10 56	10 57	11 02	11 09	11 19	11 31	11 44	11 58
6 30	12 38	12 22	12 06	11 48	11 31	11 18	11 04	11 01	11 02	11 07	11 14	11 24	11 36	11 49	12 03
7 0	12 45	12 29	12 13	11 55	11 38	11 25	11 11	11 08	11 09	11 14	11 21	11 31	11 43	11 56	12 10
7 30	12 51	12 35	12 19	12 01	11 44	11 31	11 17	11 14	11 15	11 20	11 27	11 37	11 49	12 02	12 16
8 0	12 56	12 40	12 24	12 06	11 49	11 36	11 22	11 19	11 20	11 25	11 32	11 42	11 54	12 07	12 21
8 30	12 59	12 43	12 27	12 09	11 52	11 39	11 25	11 22	11 23	11 28	11 35	11 45	11 57	12 10	12 24
9 0	12 58	12 42	12 26	12 08	11 51	11 38	11 24	11 21	11 22	11 27	11 34	11 44	11 56	12 09	12 23
9 30	12 56	12 40	12 24	12 06	11 49	11 36	11 22	11 19	11 20	11 25	11 32	11 42	11 54	12 07	12 21
10 0	12 52	12 36	12 20	12 02	11 45	11 32	11 18	11 15	11 16	11 21	11 28	11 38	11 50	12 03	12 17
10 30	12 46	12 30	12 14	11 56	11 39	11 26	11 12	11 09	11 10	11 15	11 22	11 32	11 44	11 57	12 11
11 0	12 39	12 23	12 07	11 49	11 32	11 19	11 05	11 02	11 03	11 08	11 15	11 25	11 37	11 50	12 04
11 30	12 31	12 15	11 59	11 41	11 24	11 11	10 57	10 54	10 55	11 00	11 07	11 17	11 29	11 42	11 56

Example.—Required the time of high water at North Beach, San Francisco, on the 7th of February, 1853.

1st. The time of the moon's transit at Greenwich, from the British Nautical Almanac, is 11*h.* 41*m.*; the longitude of San Francisco, 8*h.* 10*m.*, requiring a correction of 16*m.* to the time of transit at San Francisco, which is thus found to be 11*h.* 57*m.*

2d. The moon's declination is south, and at the time of transit about two days after the greatest. Entering Table I, we find 12*h.* (or 0*h.*) of transit, the nearest number to 11*h.* 57*m.*, which the table gives; and following the line horizontally until we come to two days after the greatest declination we find 13*h.* 14*m.*

To 11*h.* 57*m.* time of transit of moon, February 7, San Francisco,

Add 13 14 from column 0*h.* transit, and two days after greatest declination.

Sum 25 11, or 1*h.* 11*m.*, February 8, is the time of high water corresponding to the transit which we took of February 7. If we desire the tide of February 7, we must go back to the moon's transit of the 6th. The example was purposely assumed to show this case.

To 11*h.* 01*m.*, time of transit, February 6, 1853,

Add 13 31, number for 11*h.* transit, and one day from greatest declination.

Sum 24 32, time of high water 0*h.* 32*m.*, a. m., February 7.

The approximate times of the successive low and high waters of the day will be found by adding the numbers in Table III to the time of the first high water already determined by Tables I and II.

TABLE III.

The days from the greatest declination are written in the first and last columns of the table. The second, third, and fourth columns refer to south declination, and the fifth, sixth, and seventh to north. The second column gives the number which is to be added according to the declination to the time of high water obtained by means of Tables I and II, to give the next low water, which is a small low water. The third

contains the numbers to be added to the same to give the second or large high water. The fourth, the numbers to be added to the same to give the second or large low water. The succeeding columns give the numbers to be used in the same way for north declinations, to obtain the large low water, the small high water, and the small low water.

Days from moon's greatest declination.		SOUTH DECLINATION.			NORTH DECLINATION.			Days from moon's greatest declination.	
		Low water. (Small.)	High water. (Large.)	Low water. (Large.)	Low water. (Large.)	High water. (Small.)	Low water. (Small.)		
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.		
Before.	7	5 58	13 14	18 58	5 44	11 46	17 44	7	Before.
	6	5 36	12 42	18 48	6 06	12 18	17 54	6	
	5	5 14	12 10	18 38	6 28	12 50	18 04	5	
	4	4 55	11 34	18 21	6 47	13 26	18 21	4	
	3	4 37	11 00	18 05	7 05	14 00	18 37	3	
	2	4 24	10 34	17 52	7 18	14 26	18 50	2	
	1	4 12	10 06	17 36	7 30	14 54	19 06	1	
	0	4 12	10 00	17 30	7 30	15 00	19 12	0	
After.	1	4 17	10 02	17 27	7 25	14 58	19 15	1	After.
	2	4 27	10 12	17 27	7 15	14 48	19 15	2	
	3	4 41	10 26	17 27	7 01	14 34	19 15	3	
	4	4 56	10 46	17 32	6 46	14 14	19 10	4	
	5	5 14	11 10	17 38	6 28	13 50	19 04	5	
	6	5 36	11 36	17 42	6 06	13 24	19 00	6	
	7	5 57	12 04	17 49	5 45	12 56	18 53	7	

TABLES IV AND V.

The height of high water is obtained by the use of Tables IV and V, entering them in the same manner as Tables I and II, with the time of transit and days from greatest declination as argument. Table IV is for south declination, and Table V for north.

TABLE IV.

Time of moon's transit.	SOUTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
Hour.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
0	4.8	4.7	4.5	4.3	4.3	4.2	4.3	4.3	4.4	4.5	4.7	4.8	5.0	5.3	5.5
1	4.7	4.6	4.4	4.2	4.2	4.1	4.2	4.2	4.3	4.4	4.6	4.7	4.9	5.2	5.4
2	4.6	4.5	4.3	4.1	4.1	4.0	4.1	4.1	4.2	4.3	4.5	4.6	4.8	5.1	5.3
3	4.5	4.4	4.2	4.0	4.0	3.9	4.0	4.0	4.1	4.2	4.4	4.5	4.7	5.0	5.2
4	4.3	4.2	4.0	3.8	3.8	3.7	3.8	3.8	3.9	4.0	4.2	4.3	4.5	4.8	5.0
5	4.1	4.0	3.8	3.6	3.6	3.5	3.6	3.6	3.7	3.8	4.0	4.1	4.3	4.6	4.8
6	4.1	4.0	3.8	3.6	3.6	3.5	3.6	3.6	3.7	3.8	4.0	4.1	4.3	4.6	4.8
7	4.2	4.1	3.9	3.7	3.7	3.6	3.7	3.7	3.8	3.9	4.1	4.2	4.4	4.7	4.9
8	4.4	4.3	4.1	3.9	3.9	3.8	3.9	3.9	4.0	4.1	4.3	4.4	4.6	4.9	5.1
9	4.5	4.4	4.2	4.0	4.0	3.9	4.0	4.0	4.1	4.2	4.4	4.5	4.7	5.0	5.2
10	4.7	4.6	4.4	4.2	4.2	4.1	4.2	4.2	4.3	4.4	4.6	4.7	4.9	5.2	5.4
11	4.8	4.7	4.5	4.3	4.3	4.2	4.3	4.3	4.4	4.5	4.7	4.8	5.0	5.3	5.5

TABLE V.

Time of moon's transit.	NORTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
Hour.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
0	5.4	5.5	5.7	5.9	5.9	6.0	5.9	5.9	5.8	5.7	5.5	5.4	5.2	4.9	4.7
1	5.3	5.4	5.6	5.8	5.8	5.9	5.8	5.8	5.7	5.6	5.4	5.3	5.1	4.8	4.6
2	5.2	5.3	5.5	5.7	5.7	5.8	5.7	5.7	5.6	5.5	5.3	5.2	5.0	4.7	4.5
3	5.1	5.2	5.4	5.6	5.6	5.7	5.6	5.6	5.5	5.4	5.2	5.1	4.9	4.6	4.4
4	4.9	5.0	5.2	5.4	5.4	5.5	5.4	5.4	5.3	5.2	5.0	4.9	4.7	4.4	4.2
5	4.7	4.8	5.0	5.2	5.2	5.3	5.2	5.2	5.1	5.0	4.8	4.7	4.5	4.2	4.0
6	4.7	4.8	5.0	5.2	5.2	5.3	5.2	5.2	5.1	5.0	4.8	4.7	4.5	4.2	4.0
7	4.8	4.9	5.1	5.3	5.3	5.4	5.3	5.3	5.2	5.1	4.9	4.8	4.6	4.3	4.1
8	5.0	5.1	5.3	5.5	5.5	5.6	5.5	5.5	5.4	5.3	5.1	5.0	4.8	4.5	4.3
9	5.1	5.2	5.4	5.6	5.6	5.7	5.6	5.6	5.5	5.4	5.2	5.1	4.9	4.6	4.4
10	5.3	5.4	5.6	5.8	5.8	5.9	5.8	5.8	5.7	5.6	5.4	5.3	5.1	4.8	4.6
11	5.4	5.5	5.7	5.9	5.9	6.0	5.9	5.9	5.8	5.7	5.5	5.4	5.2	4.9	4.7

Example.—To obtain the height of the tide on February 7, 1853, the declination being south, we enter Table III, with 0*h.* of transit, and two days after greatest declination, and find that the tide will be 4.5 feet above the mean of the lower low waters, or that 4.5 feet are to be added to the soundings of a chart reduced to the mean of the lower low waters of each day. If the soundings of the chart were given for mean low water, then 1.2 foot ought to be subtracted from the Tables III and IV; thus, in this example, it would be 3.3 feet.

The rise and fall of the same successive tides may be obtained by inspection from Tables VI and VII, in which the first column, at the side, contains the time of transit, and the successive columns the numbers corresponding to that time, and to the number of days from greatest declination.

TABLES VI AND VII.

The arangement of these tables is similar to that already given. In Table VI the numbers for the small ebb tide are given, and then those for the rise from small low water to the larger high water. In Table VII the numbers for the large ebb tide are given, and then those for the rise from the large low water to the small high water.

TABLE VI.

Hours of moon's transit.	SMALL EBB TIDE, OR FROM SMALL HIGH WATER TO SMALL LOW WATER.														
	Days from moon's greatest declination.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
H.	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft*	*Ft.*	*Ft.*
0	4.7	4.0	3.4	2.9	2.4	2.0	1.8	1.7	1.7	1.9	2.2	2.6	3.1	3.7	4.4
1	4.5	3.8	3.2	2.7	2.2	1.8	1.6	1.5	1.5	1.7	2.0	2.4	2.9	3.5	4.2
2	4.3	3.6	3.0	2.5	2.0	1.6	1.4	1.3	1.3	1.5	1.8	2.2	2.7	3.3	4.0
3	4.0	3.3	2.7	2.2	1.7	1.3	1.1	1.0	1.0	1.2	1.5	1.9	2.4	3.0	3.7
4	3.6	2.9	2.3	1.8	1.3	0.9	0.7	0.6	0.6	0.8	1.1	1.5	0.0	2.6	3.3
5	3.2	2.5	1.9	1.4	0.9	0.5	0.3	0.2	0.2	0.4	0.7	1.1	1.6	2.2	2.9
6	3.2	2.5	1.9	1.4	0.9	0.5	0.3	0.2	0.2	0.4	0.7	1.1	1.6	2.2	2.9
7	3.4	2.7	2.1	1.6	1.1	0.7	0.5	0.4	0.4	0.6	0.9	1.3	1.8	2.4	3.1
8	3.8	3.1	2.5	2.0	1.5	1.1	0.9	0.8	0.8	1.0	1.3	1.7	2.2	2.8	3.5
9	4.1	3.4	2.8	2.3	1.8	1.4	1.2	1.1	1.1	1.3	1.6	2.0	2.5	3.1	3.8
10	4.5	3.8	3.2	2.7	2.2	1.8	1.6	1.5	1.5	1.7	2.0	2.4	2.9	3.5	4.2
11	4.7	4.0	3.4	2.9	2.4	2.0	1.8	1.7	1.7	1.9	2.2	2.6	3.1	3.7	4.4

Hours of moon's transit.	FROM SMALL LOW WATER TO LARGE HIGH WATER.															Hours of moon's transit.
	Days from moon's greatest declination.															
	Before—								After—							
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	
H.	*Ft.*	*Ft*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft*	*Ft.*	*H.*
0	5.2	4.9	4.6	4.5	4.0	3.7	3.4	3.2	3.1	3.0	3.1	3.1	3.3	3.4	3.5	0
1	5.0	4.7	4.4	4.3	3.8	3.5	3.2	3.0	2.9	2.8	2.9	2.9	3.1	3.2	3.3	1
2	4.8	4.5	4.2	4.1	3.6	3.3	3.0	2.8	2.7	2.6	2.7	2.7	2.9	3.0	3.1	2
3	4.5	4.2	3.9	3.8	3.3	3.0	2.7	2.5	2.4	2.3	2.4	2.4	2.6	2.7	2.8	3
4	4.1	3.8	3.5	3.4	2.9	2.6	2.3	2.1	2.0	1.9	2.0	2.0	2.2	2.3	2.4	4
5	3.7	3.4	3.1	3.0	2.5	2.2	1.9	1.7	1.6	1.5	1.6	1.6	1.8	1.9	2.0	5
6	3.7	3.4	3.1	3.0	2.5	2.2	1.9	1.7	1.6	1.5	1.6	1.6	1.8	1.9	2.0	6
7	3.9	3.6	3.3	3.2	2.7	2.4	2.1	1.9	1.8	1.7	1.8	1.8	2.0	2.1	2.2	7
8	4.3	4.0	3.7	3.6	3.1	2.8	2.5	2.3	2.2	2.1	2.2	2.2	2.4	2.5	2.6	8
9	4.6	4.3	4.0	3.9	3.4	3.1	2.8	2.6	2.5	2.4	2.5	2.5	2.7	2.8	2.9	9
10	5.0	4.7	4.4	4.3	3.8	3.5	3.2	3.0	2.9	2.8	2.9	2.9	3.1	3.2	3.3	10
11	5.2	4.9	4.6	4.5	4.0	3.7	3.4	3.2	3.1	3.0	3.1	3.1	3.3	3.4	3.5	11

TABLE VII.

Time of moon's transit.	LARGE EBB TIDE, OR FROM LARGE HIGH WATER TO LARGE LOW WATER															FROM LARGE LOW WATER TO SMALL HIGH WATER.															Time of moon's transit.
	Days from moon's greatest declination.															Days from moon's greatest declination.															
	Before—								After—							Before—								After—							
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	
H.	Ft	Ft	Ft.	Ft.	Ft.	Ft.	Ft	Ft.	Ft.	Ft.	Ft.	Ft	Ft.	Ft.	Ft	Ft	Ft.	Ft	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft	Ft.	Ft.	Ft.	H.
0	3.9	4.6	5.2	5.7	6.2	6.6	6.8	6.9	6.9	6.7	6.4	6.0	5.5	4.9	4.3	3.4	3.7	4.0	4.1	4.6	4.9	5.2	5.4	5.5	5.6	5.6	5.5	5.3	5.2	5.2	0
1	3.7	4.4	5.0	5.5	6.0	6.4	6.6	6.7	6.7	6.5	6.2	5.8	5.3	4.7	4.0	3.2	3.5	3.8	3.9	4.4	4.7	5.0	5.2	5.3	5.4	5.3	5.3	5.1	5.0	5.0	1
2	3.5	4.2	4.8	5.3	5.8	6.2	6.4	6.5	6.5	6.3	6.0	5.6	5.1	4.5	3.8	3.0	3.3	3.6	3.7	4.2	4.5	4.8	5.0	5.1	5.2	5.1	5.1	4.9	4.8	4.8	2
3	3.2	3.9	4.5	5.0	5.5	5.9	6.1	6.2	6.2	6.0	5.7	5.3	4.8	4.2	3.5	2.7	3.0	3.3	3.4	3.9	4.2	4.5	4.7	4.8	4.9	4.8	4.8	4.6	4.5	4.5	3
4	2.8	3.5	4.1	4.6	5.1	5.5	5.7	5.8	5.8	5.6	5.3	4.9	4.4	3.8	3.1	2.3	2.6	2.9	3.0	3.5	3.8	4.1	4.3	4.4	4.5	4.4	4.4	4.2	4.1	4.1	4
5	2.4	3.1	3.7	4.2	4.7	5.1	5.3	5.4	5.4	5.2	4.9	4.5	4.0	3.4	2.7	1.9	2.2	2.5	2.6	3.1	3.4	3.7	3.9	4.0	4.1	4.0	4.0	3.8	3.7	3.7	5
6	2.4	3.1	3.7	4.2	4.7	5.1	5.3	5.4	5.4	5.2	4.9	4.5	4.0	3.4	2.7	1.9	2.2	2.5	2.6	3.1	3.4	3.7	3.9	4.0	4.1	4.0	4.0	3.8	3.7	3.7	6
7	2.6	3.3	3.9	4.4	4.9	5.3	5.5	5.6	5.6	5.4	5.1	4.7	4.2	3.6	2.9	2.1	2.4	2.7	2.8	3.3	3.6	3.9	4.1	4.2	4.3	4.2	4.2	4.0	3.9	3.9	7
8	3.0	3.7	4.3	4.8	5.3	5.7	5.9	6.0	6.0	5.8	5.5	5.1	4.6	4.0	3.3	2.5	2.8	3.1	3.2	3.7	4.0	4.3	4.5	4.6	4.7	4.6	4.6	4.4	4.3	4.3	8
9	3.3	4.0	4.6	5.1	5.6	6.0	6.2	6.3	6.3	6.1	5.8	5.4	4.9	4.3	3.6	2.8	3.1	3.4	3.5	4.0	4.3	4.6	4.8	4.9	5.0	4.9	4.9	4.7	4.6	4.6	9
10	3.7	4.4	5.0	5.5	6.0	6.4	6.6	6.7	6.7	6.5	6.2	5.8	5.3	4.7	4.0	3.2	3.5	3.8	3.9	4.4	4.7	5.0	5.2	5.3	5.4	5.3	5.3	5.1	5.0	5.0	10
11	3.9	4.6	5.2	5.7	6.2	6.6	6.8	6.9	6.9	6.7	6.4	6.0	5.5	4.9	4.3	3.4	3.7	4.0	4.1	4.6	4.9	5.2	5.4	5.5	5.6	5.5	5.5	5.3	5.2	5.2	11

Example.—Thus, in the preceding example the high water of February 7 was found to be 3.3 feet above mean low water. The declination being south, this high water is the small one. To obtain the fall of the next low water, or small low water, we enter Table VI, with 0*h.* of moon's transit, and two days after greatest declination, in the first part of the table, and find 1.9 foot, which will be the difference in height of this high and low water. Entering with the same transit and day in the second part, we find 3.3 feet, which is the rise of the large high water above the small low water; the difference between 1.9 foot and 3.0 feet, or 1.1 foot, is the difference of height of the two successive high waters. It is easy to see how, in this way, the soundings of a chart can be reduced to what they would be approximately at all the successive high and low waters.

THE SEASONS.—There are but two seasons on the Pacific coast, usually denominated the dry and rainy seasons; the former corresponding to the Atlantic summer, the latter to the winter; but much error exists in regard to them, especially as to the amount of rain falling during the rainy season. The following totals of rain that fell at San Francisco during each wet season, from 1850 to 1862, will show that the yearly amount is not great:

During the wet season of	1850–'51	there fell	7.0	inches.		
" " "	1851–'52	"	19.0	"		
" " "	1852–'53	"	32.7	"		
" " "	1853–'54	"	21.9	"		
" " "	1854–'55	"	24.3	"		
" " "	1855–'56	"	20.7	"		
" " "	1856–'57	"	20.2	"		
" " "	1857–'58	"	21.7	"		
" " "	1858–'59	"	22.0	"		
" " "	1859–'60	"	22.0	"		
" " "	1860–'61	"	19.4	"		
" " "	1861–'62	"	48.5	"	to the middle of April.	
Average of twelve wet seasons			23.3			

The wet season of 1861–'62 was remarkable for the disastrous effects of the great rains in December and January. In the latter half of December, 6.3 inches fell; in the first half of January, 15.9 inches; and in the latter half of January, 8.5 inches. At Sonora, Tuolumne county, no less than 72 inches were registered between November 11, 1861, and January 14, 1862. Millions of dollars' worth of property were destroyed in the Sacramento valley.

The following table will show how the foregoing yearly amounts were distributed each month, from November, 1850, to the middle of April, 1862:

Mean	monthly	rain	for January,	4.90	inches.
"	"	"	February,	3.69	"
"	"	"	March,	3.51	"
"	"	"	April,	2.02	"
"	"	"	May,	.85	"
"	"	"	June,	.02	"
"	"	"	July,	.02	"
"	"	"	August,	.02	"
"	"	"	September,	.02	"
"	"	"	October,	.77	"
"	"	"	November,	2.53	"
"	"	"	December,	4.90	"
Giving a yearly average of.....				23.25	

An examination of the extended tables from which the above results are derived, show that as a rule the greatest depth of water falls in December, and that during the latter half of December, and the first half of January, one-fourth of the average falls.

There is a very notable abatement from the middle of January to the middle of February. In 1851 we noticed this particularly when stationed at Point Pinos, because the above period was much prolonged. In 1852, while observing near the Presidio of San Francisco, we found this period to extend from the early part of January to near the end of February. In 1858–'60, and '61, and the exceptional part of 1862, we found this cessation marked.

During the latter part of March heavy rains occur, and about the middle of April. The southerly winds generally bring the rain. During the seasons we passed about San Francisco, we never heard thunder or saw lightning, and never but once saw snow fall, and then only at an elevation of 400 feet; the line being distinctly marked, and the elevation being well determined by a knowledge of the height of the hills. On the mountains of the seaboard snow frequently falls, but with trifling depth.

The fogs that prevail upon the coast during the dry season have an elevation of 1,300 to 1,700 feet; generally the former, and only upon one occasion have we determined the latter. Through this dense cloud the mountain tops pierce as islands.

The following statement will give a general idea of the temperature of the seaboard. The interior is much warmer, but on account of the dryness of the atmosphere the effect is not so enervating to the system as a lower temperature on the Atlantic.

Mean temperature at sunrise and noon for seven years, from 1851 *to* 1857, *computed from the California State Register for* 1859.

	Sunrise.	Moon.
	Deg. Fahr.	*Deg. Fah.*
January	44.2	57.6
February	46.8	60.0
March	47.8	63.0
April	49.6	65.7
May	50.0	64.5
June	51.8	68.2
July	52.6	67.5
August	53.6	67.9
September	53.8	69.8
October	52.7	68.4
November	49.4	62.0
December	44.9	55.8
Average	49.8	64.2

The lowest temperature experienced at San Francisco in the above six years was 25° Fah., in January, 1854. In 1852, '53, '56, the temperature was always above freezing, and falling no lower than 28° in 1850; 40° in 1853; 29° in 1855; 31° in 1857.

The highest temperature was 98°, in September, 1852, and that may be considered remarkably high, 93° and 90° having been reached but once.

The mean temperature of spring is 54°, of summer 57°, of autumn 56°, and of winter 50°, showing a difference of only seven degrees between the average of winter and summer. There is a range of nine degrees in the mean temperature of the months; and the mean of the whole year is about 54°.

The mean temperature at Sacramento, latitude 38° 33′ north, and longitude 121° 20′, and 75 miles from the ocean, for five years observations, is 60° 5 .

Clipper passages.—The number of clippers arriving at San Francisco from New York during the 10 years, 1850 to 1859, was 663, and the average length of the passage was 135.7 days. In the same years 373 arrived from Boston, and the average passage was 136 days.

In 1850 six clippers arrived from New York averaging only 115 days; the Sea Witch being reported at 97 days, but her actual passage was 101. The average passage of all American vessels that arrived from Atlantic ports was 187 days.

In 1851 only two clippers made the passage in less than 100 days—the Surprise in 96, and the Flying Cloud in 90, both from New York.

In 1852 the Flying Fish made it in 98 days from Boston, and the Sword Fish in 93 from New York.

In 1853 it was made by the Contest in 97 days, Flying Fish in 92, John Gilpin in 93, and the Oriental reported 100; all from New York.

In 1854 the passage was made by the David Brown in 98 days, the Flying Cloud in 89, the Hurricane in 99, the Witchcraft in 97, from New York; and by the Romance of the Seas in 96 days from Boston.

In 1855 no vessel made it in 100 days, although the Herald of the Morning and Neptune's Car reported in 100 from New York, and the Westward Ho in 100 from Boston.

In 1856 the Antelope made it in 97 days, and the Sweepstakes in 94 from New York.

In 1857 the Flying Dragon arrived in 98 days, and the Great Republic in 92 from New York. The Danish clipper Cimbar made the trip from Liverpool in 106 days, the quickest on record.

In 1858 the ship Twilight made the passage in 100 days, and the Andrew Jackson in 99 days from New York.

In 1859 no vessel made the passage in 100 days. The Andrew Jackson made the shortest trip, in 102 days from New York.

In 1860 the ship Sierra Nevada made the passage from Boston in 97¼ days, and the Andrew Jackson from New York in 90¼ days.

The shortest passage made from New York to San Francisco by steamship, *via* the Isthmus of Panama, was by the Moses Taylor on the eastern side, and the Golden Age on the western; their actual running time 19 days 23 hours; total time from dock to wharf 21 days, 2 hours, 13 minutes, arriving at San Francisco February 26, 1858.

The clipper Northern Light, of Boston, is reported to have made the run from San Francisco to New York, in ballast, in 75¼ days, and the Trade Wind, with cargo, in 84 days. The average time of passage is about 100 days.

The average length of passages from other prominent ports is given for the years 1857, '58, and '59.

From China 32 vessels arrived in 1857, averaging 59 days, the quickest trip from Shanghai being 34 days, by the tern Spray, and from Hong Kong in 35 days, by the schooner Giulietta.

In 1858 28 vessels arrived, averaging 53 days, and in 1859 28 vessels, averaging 54½ days.

From Honolulu 19 vessels arrived in 1851, averaging 19½ days, the shortest trip being made by the barque Yankee, in 13 days.

In 1858 25 vessels arrived, averaging 15 days, the shortest trip being made by the barque Yankee, in 11 days. In 1859 20 vessels arrived, averaging 20 days, the shortest passage being by the barque Onward, in 10 days.

For a period of five years ending August 1, 1859, a record was kept of 427 passages between San Francisco and Honolulu. The average time of 224 passages from San Francisco to Honolulu was 16⅞ days, four being made in 9½ days each. The average time of 203 passages from Honolulu to San Francisco was 20 days, three being made in 11 days each.

From Valparaiso 17 vessels arrived in 1857, averaging 53 days, the shortest passage being made by the Danish ship Velox, in 37 days. In 1858 16 vessels arrived, averaging 73 days.

From Australia 13 vessels arrived in 1857, averaging 81½ days, the shortest passage by the topsail schooner Vaquero, in 57 days. In 1858 14 vessels arrived, averaging 80 days, the shortest passage being made by the Vaquero, in 54 days. In 1859 27 vessels arrived, averaging 76 days.

Statistics.—Previous to the discovery of gold in California, San Francisco bay furnished few inducements for traders or whalers to visit. Cattle were cheap, but about the only provisions to be obtained, and these were valuable solely for their hide and tallow; "fine fat bullocks, weighing from 400 to 500 pounds, hide included, were purchased at $5 each, and sheep at $2."—(Belcher, Vol. I, page 135.) "All the forts were in ruins, and not even a single gun mounted" at the time of his visit in 1837, and Wilkes's description of the few miserable *adobe* buildings at Yerba Buena, the site of San Francisco, fully proves how fast the country was driving to wreck. In 1848 the resources, the population, and geography of the State were almost unknown; but since then she has commanded the attention of the world. She stands alone as an example of all past time of a country emerging so suddenly from obscurity, and at one gigantic stride assuming the importance and complicated relations of a large empire. In less than fifteen years she has acquired a population of over half a million, and has developed the wonderful resources comprised within her limited boundaries. On the site of half a dozen adobe buildings has risen a city of 90,000 inhabitants, in whose streets is seen the dress and heard the tongue of every nation. The last census represents the taxable property of San Francisco at $36,967,499, and that of the entire State at $148,198,540. Over 600 ships, under every known flag, have been anchored at one time in the harbor of San Francisco. The commercial enterprise developed has given birth to a new era of naval architecture; the old-fashioned full, clumsy-bowed ships, that carried the early adventurers round Cape Horn, and made their passages in something less than a year, have played out their part, and have been succeeded by the famed clippers. In 1860 not one of the old deserted hulks disfigured the harbor.

In the first three quarters of 1849 no less than 509 large vessels entered the bay; at the end of August of that year there were 62,000 tons of shipping at anchor, exclusive of vessels running on the Sacramento, San Joachim, the adjacent bays, and in the coasting trade. On the 24th of September over 11,000 tons of shipping entered the Golden Gate, and at the end of September there were 94,500 tons in the harbor. For a city one year old, and 17,500 miles from the nearest eastern ports, this may well be viewed as marvellous.

Tonnage of San Francisco.—At the end of the fiscal year, June 30, 1855, there were registered, enrolled, and licensed, at the custom-house of San Francisco, owned wholly or in part by citizens of California, 702 steam and sailing vessels engaged in trade upon the Pacific, distributed under the following heads:

Registered tonnage.

3 steamships	1,058 tons.	
36 ships	14,428 tons.	
59 barques	15,999 tons.	
50 brigs	8,592 tons.	
49 schooners	5,887 tons.	
Total		45,964

Enrolled tonnage.

45 steamships	11,223 tons.	
1 ship	386 tons.	
17 barques	3,759 tons.	
28 brigs	4,667 tons.	
127 schooners	8,774 tons.	
59 sloops	2,137 tons.	
Total		30,946

In addition to the above, there were licensed at that time, as coasters, 228 schooners and sloops below 20 tons each, with an aggregate tonnage of	2,399
Making a total of permanent registered, enrolled, and licensed tonnage of 702 vessels of	79,309

We have no means now at hand for ascertaining the increase up to 1857, but the following tables, exhibiting the tonnage entering and clearing the port of San Francisco, may not be without interest:

Tonnage of the port of San Francisco.

Years.	ARRIVALS.		DEPARTURES.	
	American vessels from American & foreign ports.	Foreign vessels from foreign ports.	American vessels to American & foreign ports.	Foreign vessels to foreign ports.
	Tons.	*Tons.*	*Tons.*	*Tons.*
1849	108,644	*65,729	.....	.....
1850	255,428	*131,628	.....	.....
1851	292,940	*125,965	.....	.....
1852	268,737	132,094	344,760	131,111
1853	404,220	124,874	501,229	137,110
1854	336,058	76,127	426,775	83,871
1855	325,102	55,148	369,213	48,322
1856	305,519	40,378	347,451	41,809
1857	382,958	44,608	291,879	45,143

* Books of custom-house destroyed by fire.

A great number of vessels that arrived in 1849, '50, '51, began to clear in 1852, when seamen could be obtained.

The following shows in more detail the shipping operations of the year 1857:

Table showing the shipping entered and cleared at the port of San Francisco for the year 1857.

	Entered.	Tons.
Number of American vessels from American ports	1,328	291,561
Number of American vessels from foreign ports	130	91,397
Number of foreign vessels from foreign ports	125	44,608
	1,583	427,566
	Cleared.	Tons.
Number of American vessels for American ports	516	108,538
Number of American vessels for foreign ports	203	183,341
Number of foreign vessels for foreign ports	129	45,608
	848	337,022

The difference noticeable between the vessels entered from and cleared for American ports is owing to the fact that these vessels are not required to clear at the custom-house, and therefore many departures are not noticed.

For the year 1860 the reported tonnage of vessels entered was 538,081, and cleared, 393,355.

Table showing the total tonnage entered from eastern States and from foreign ports, with the amount of freights paid upon the cargoes.

Years.	Tons.	Freight.
1853	407,235	$11,752,084
1854	254,714	5,311,612
1855	247,682	3,999,755
1856	236,389	4,592,104
1857	197,814	2,842,671
1858	313,158	3,836,197
1859	374,338	4,763,131
1860	336,658	4,110,050

The steamship tonnage entered from Panama and San Juan del Sur, and the coasting tonnage entered, were as follows:

Years.	Steamship.	Coasting.
	Tons.	*Tons.*
1853	83,432	67,213
1854	85,735	59,230
1855	77,280	146,495
1856	65,477	138,149
1857	47,716	182,036
1858	.....	136,781
1859	.....	209,002
1860	.....	201,423

During the years 1856, 1857, the movements of the filibusters retarded, and finally put a stop to all travel across the isthmus of Nicaragua, and the steamships were hauled off. In 1862 the line was again opened.

Table of the value of imports, free and otherwise, into the district of San Francisco.

1854	$5,899,620
1855	7,144,075
1856	9,155,507
1857	9,528,291
1858	8,984,688

Table showing the value of imports of certain articles, such as flour, grain, salt meats, &c., now produced in California.

1853	$14,021,940
1854	5,161,586
1855	2,444,626
1856	1,248,343
1857	1,631,467

Table showing the receipts of customs of the port of San Francisco, and the expenditures.

Year.	Receipts.	Expenditures.
1848, 1849	$1,581,640	.....
1850	1,908,220	$303,033
1851	2,316,675	1,009,436
1852	2,008,410	655,694
1853	2,589,406	684,114
1854	1,563,103	646,288
1855	1,804,904	438,684
1856	1,713,408	441,678
1857	1,504,137	607,090
1858	.....	425,886

Value of the exports of leading articles of California produce from San Francisco.

1854	$1,496,761
1855	2,753,147
1856	2,279,942
1857	2,319,266
1858	2,526,791
1859	2,129,330
1860	4,948,921

Of these amounts the following are the principal items :

Year.	Wheat, oats, barley.	Flour.	Hides.	Wool.	Quicksilver.
1853	.....	.....	.....	.....	$611,000
1854	$49,689	$523,035	$107,500	$14,000	648,317
1855	378,351	925,728	338,310	36,000	975,621
1856	92,500	588,080	443,517	80,000	833,185
1857	445,665	90,050	681,788	165,000	954,100
1858	404,226	179,630	549,032	199,969	870,500
1859	736,484	164,281	454,092	356,737	*126,262
1860	2,239,939	590,763	600,750	397,192	*338,330
1861	.....	.....	.....	.....	†952,518

* In these years the New Almaden mines were stopped by legal embarrassments.
† Up to the end of October.

Table showing the passengers arrived by steamship and sailing vessels at the port of San Francisco.

Year.	Arrived.	Departed.
1849	91,405	.....
1850	36,462	.....
1851	27,182	.....
1852	66,988	22,946
1853	33,233	30,001
1854	47,531	23,508
1855	29,198	22,898
1856	28,119	22,747
1857	24,759	16,906
1860	27,586	12,857

The following table will exhibit the tonnage movement of the principal cities of the United States for the year 1856:

City.	Entered.	Cleared.	Total.
New York	1,681,659	1,520,623	3,202,282
Boston	682,165	647,404	1,329,569
New Orleans	663,067	773,162	1,436,229
San Francisco	345,897	389,260	735,157
Philadelphia	173,179	129,739	302,918

It would be doing injustice to the State not to give a few facts relating to her principal mineral wealth.

The average amount of gold taken from the country during the nine years 1850–'59 has been fully $55,000,000 per annum; the average value of the exported cotton crop of the United States for the same period was $105,908,327, and of the breadstuffs and provisions $46,022,165.

The following table exhibits the amount of gold shipped, per manifest, from San Francisco, from 1849 to 1863, inclusive:

1849	$4, 921, 250
1850	27, 676, 346
1851	42, 582, 695
1852	46, 586, 134
1853	57, 331, 024
1854	51, 328, 653
1855	43, 080, 211
1856	48, 887, 543
1857	48, 976, 207
1858	47, 528, 786
1859	47, 664, 999
1860	42, 302, 346
1861	40, 639, 090
1862	42, 380, 809
1863	41, 569, 876
	633, 455, 876

The gold and silver coinage of the branch mint of San Francisco, from its organization to June 30, 1862, has been as follows:

Year.	Gold.	Silver.	Total.
1854	$9,731,574	.....	$9,731,574
1855	20,957,677	$164,075	21,121,752
1856	28,315,538	200,609	28,516,147
1857	12,490,000	50,000	12,540,000
1858	19,276,096	147,503	19,423,599
1859	13,906,272	327,970	14,234,242
1860	11,889,000	572,912	12,461,912
1861	12,421,000	269,485	12,690,485
Total	128,987,157	1,732,554	130,719,711

The following figures will exhibit the marked influence which the gold product of California has had upon the coinage of the United States. For the 57 years previous to 1850 the total gold, silver, and copper coinage was $162,161,731; of this $85,349,197 was gold. From January 1, 1850, to June 30, 1861, the gold coinage was $583,698,592; the silver, $53,146,814; the copper, $1,395,740; or a total of $638,241,146 in eleven and a half years. The entire deposit of domestic gold, since the organization of the mint, has been $523,529,409, of which California produced $501,290,998.

California placer gold has a dark color from its light coating of oxide of iron; but, when fused, its light color indicates a large per-centage of silver. The average fineness of California gold, as determined by some thousand assays at the United States mint, Philadelphia, is 885 thousandths, or 88½ per cent. pure gold, and 115 thousandths, or 11½ per cent. of silver. The quantity of platinoid metals found in the gold is small, about 1½ pound of iridosmin having been obtained from about 25 tons of the gold ($\frac{3}{100000}$), but the greater part had, of course, passed into the coin, the coarse grains only being left.

The recent developments of the silver mines of Nevada Territory, on the eastern boundary of California, lead to the conclusion that not less than $12,000,000 of silver will be produced from them in 1862.

Agriculture.—The amount of land in California adapted to the purposes of agriculture is estimated at 41,622,400 acres, exclusive of the swamp and overflowed lands, estimated at 5,000,000; which, when reclaimed, will produce every variety of crop. On the Sacramento the experiment is being made to cultivate rice with Chinese labor. The amount of grazing land is estimated at 30,000,000 acres. The amount of land under cultivation in 1856 was 578,963 acres; and of that enclosed for the purposes of agriculture, about 120,000. The amount in wheat was 176,869 acres, and the product 3,979,032 bushels; in barley 154,674 acres, and the product 4,639,678 bushels; in oats 37,602 acres, and the product 1,263,359 bushels. Part of this season was characterized by a severe drought.

In 1858 the amount of land under cultivation was 756,734 acres. The amount in wheat was 186,464 acres, yielding 3,568,669 bushels. Napa county was the heaviest wheat-growing district; 16,000 acres yielded an average of 31⅛ bushels to the acre.

The president of the State Agricultural Society, in his address of 1856, before that body, says: "It it is now a well-ascertained fact, established by several years' experience, that California stands without a rival in respect to her capacity for producing wheat and other small grains. She produces it in larger quantities to the acre, of better quality, with more certainty, and with less labor, than any other country in the known world."

In 1858 the number of acres under cultivation for barley was 237,692, producing 5,382,718 bushels, exceeding the aggregate of the crops of the United States in 1850.

Dr. Trask, in the "Geology of the State," says: "Toward the foot-hills of the mountains on the west of the San Joachim valley is a low table of the valley, apparently destitute of water, either for the support of vegetation or animal life; in some parts this land has a slight gravelly appearance, but this is not general. On one rancho, situated on this plateau, there have been two full crops of barley harvested from the same piece of ground, and when I visited this place, in October, the third crop was being then harrowed in, the whole having occurred within the term of 263 [consecutive] days."—(Page 54.)

The following extract from the report of the visiting committee for 1856 will best illustrate the extraordinary capacity of the soil for the culture of this important grain: "Near Alviso, Santa Clara county, there is a field of barley, fifty acres in extent, which has averaged the present season forty-three bushels to the acre. This is the fifth crop from a single sowing; it has received no special care, and may be regarded as a memorable example of a succession of volunteer crops."

In 1858 the number of acres under cultivation for oats was 44,616, and the produce 1,322,221 bushels. Crops of this grain have frequently averaged 75 bushels to the acre, and one crop from 32 acres, in Alameda county, averaged 134 bushels in 1856. In Del Norte county, during the year of 1858, two crops of oats yielded an average of 125 and 157 bushels, respectively, and a crop of barley 100 bushels to the acre.

The cultivation of the grape, and its manufacture into wines and brandies, is rapidly assuming a degree of importance, and increasing to such an extent that these products must soon become one of the most reliable and lucrative branches of the resources of the State. The experience of the last few years has proved conclusively that this country produces this fruit in the greatest variety and abundance, and in a few years will surpass the most extensive wine-producing countries of the world. The number of vines in cultivation in 1856 was 1,532,224, and the average yield over fifteen pounds of fruit. The number of all kinds of fruit trees that year was 1,296,783, and the fruit far superior to any on the Atlantic or Gulf seaboard.

In 1857 the number of vines was 3,954,548, and the average yield 14 pounds. The number of all kinds of fruit trees was 1,963,349. The partial returns for 1858 indicated an increase of seventy-five per cent. over 1857.

The two great staples, cotton and flax, will render the country independent of other places for her manufactures, whilst the production of silk bids fair to go hand in hand with both. The true wealth of the country has but commenced its development, and in a short period she will successfully compete with the Atlantic States and Europe for the markets of the Pacific.

Regular mail communication is maintained by steamships with the Atlantic and the Gulf States twice* a month, crossing the Isthmus of Panama by 47½ miles of railroad; the transit from steamer to steamer occupying four hours. For the year ending June 30, 1856, the number of letters conveyed by this route was 2,365,902, and newspapers 3,463,817; the number of letters and newspapers exchanged between the United States and Great Britain, in British mails by the Collins, Cunard, Bremen, and Havre lines, for the same time, was 3,909,128 (letters,) and 3,196,014 (newspapers.) The comparison speaks well for the modern El Dorado.

The entrance to San Francisco bay is supposed to have been first seen by Bartolome Ferrelo, pilot and successor to Juan Rodriguez Cabrillo, who, running down the coast with a gale strong from the north, on the 3d of March, 1543, descried what he supposed to be the mouth of a great river, having every appearance of draining a large extent of country; and steering SE. and E.SE. he soon after sighted Point Pinos, and on the 5th the port in the Island of Juan Rodriguez, where Cabrillo is supposed to have died. If this account is correct, he was the first European that beheld the Golden Gate.

Sir Francis Drake visited California, which he named New Albion, in 1579, and we are of opinion that in this bay he overhauled and repaired his vessel; "it having pleased God to send him into a fair and good bay, with a good wind to enter the same." Curiously enough, we find the statement that "there is no part of the earth here to be taken up wherein there is not some probable show of gold and silver." In this harbor he remained over a month "trimming" his ships and taking possession of the country.

A land discovery of the bay was made in 1769 by Gaspar de Portola, who left San Diego to establish a Jesuit colony at Monterey; but by travelling along the eastern slope of the Coast mountains he passed Monterey, and towards the close of October came unexpectedly upon the shores of a great bay, which they supposed to be the Port St. Francisco of the old navigators. Having no supplies, the party returned to San Diego.

Vancouver visited the bay in 1792 and 1793, and gives a good general map of the entrance. The presidio of San Francisco was then occupied by Spanish troops.

The first accurate hydrographic survey was made by Capt. Fred. W. Beechy, in the Blossom, in November, 1826, he carrying his work to the Strait of Karquines.

In October, 1837, Capt. Sir Edward Belcher ascended the Sacramento with the boats of the Sulphur, and starting from the "Fork" carried the survey down the river to connect with Beechy's survey. The "Fork" he calls Point Victoria, and places in latitude 38° 46′ 47″. and 0° 47′ 31″.5 east of the observatory on Yerba Buena. This point is formed by the confluence of the Rio de las Plumas, or Feather river, with the Sacramento, about 20 miles above Sacramento city. The river, but a short distance above his starting point, was fordable, and thence to its mouth traversed in its meanderings 150 miles. The head of steamboat navigation is at Red Bluffs, in latitude 40° 10′.

The Coast Survey charts of 1857 furnish all that can be desired in regard to the lower part of the bay of San Francisco, the upper bays, and the waters approaching the mouth of the Sacramento.

DUXBURY POINT AND REEF

From Point Boneta to Duxbury Point, forming the west side of Ballenas bay, the course is W. by N. ¼ N., and the distance 9¼ miles. The point, sometimes called Ballenas, is a table land about 100 feet high, which stretches along the coast for a mile or more, and gradually rises to a narrow, nearly treeless ridge, 1,389 feet high at its greatest elevation, and running in a straight line 25¼ miles NW. ¼ W. to Tomales Point. The old Californians expressively call it the Cuchilla Grande. Parallel to this ridge on the east, and starting from the west end of the great cross ridge of Table mountain, runs another to the northwestward, and the depression between them, abreast of Duxbury Point, forms the Ballenas bay, as it does the Tomales bay further

* Every ten days since 1862.

up the coast. This depression forms a long narrow valley, well watered and timbered, and in many places cultivated. Two streams running into each bay, have their sources nearer the bay from which each runs.

Duxbury reef makes out 1¼ mile SE. ¼ S. from the southern extremity of the point, and stretching towards Point Boneta, forms a safe anchorage in northerly weather. From the tail of the reef to the rocky point E.NE. from it, the distance is three miles, and from this line to the greatest bend of the bay the distance is 1¾ mile. In this bay the three-fathom line makes off three-quarters of a mile from the southeast face of Duxbury Point, but approaching the low sand beach east of the narrow entrance to the lagoon. From four to eight fathoms of water, with a regular bottom of sand and mud, are formed in the bay, and six fathoms quite close to the reef. From Duxbury Point to the bluff, at the entrance to the lagoon, the distance is 1¼ mile NE. by N.

In June, 1860, the British barque Camilla, from San Francisco to Melbourne, drifted in a dead calm near Duxbury reef, and let go her anchors in six fathoms. When she swung to the swell and current her stern struck, and she thumped for four hours.

Quite close to Duxbury Point the steamship S. S. Lewis went ashore, April 9, 1853, in a thick fog and calm, while running at her ordinary speed. She was backed off and ran ashore again within a few hundred yards to the northward, and was totally lost in the breakers.

The lagoon north of the bay is at the foot of the mountains, and, except small crooked channels, is bare at low tides, and filled with small islets. The south side of this lagoon is bounded by a long, narrow sand spit, stretching so nearly across it as to leave an entrance of but 100 yards wide at the southwest part of it. Only a few small vessels run between this place and San Francisco.

The shore north of Boneta is bold and high, presenting a marked and peculiar undulating surface at right angles to the sea front. This characteristic is well delineated on the Coast Survey map of the approaches and entrance to San Francisco bay, published in 1857.

North of Duxbury the hard rocky shore continues bold and high, but gradually merges into cliffs, consisting chiefly of yellowish clay and sand resting upon granite, and, as the surface is regularly undulating, with the direction of the alternate ridges and valleys at right angles to the shore, the wearing action of the surf forms a continuous series of round-topped, bright, vertical bluffs, averaging nearly 100 feet high, and presenting a very noticeable feature from the sea. Its resemblance to portions of the coast of England was one of the reasons which induced Drake to apply the name New Albion to the country in June, 1579.

The mountains in the back ground rise over 2,000 feet, and the "Table mountain" of Beechy attains an elevation of 2,604 feet, stretches nearly two miles inland at right angles to the coast, and forms a prominent mark from seaward and from the bay of San Francisco. A few large trees are seen along the top of the main ridge running parallel with the coast and behind the valley, connecting Ballenas and Tomales bays.

Table mountain is a very sharp ridge, showing flat-topped only in two directions. From South Farallon light-house it bears NE. ½ N., distant 24 miles; the geographical position of the eastern peak is:

	° ′ ″
Latitude	37 55 36.7 north.
Longitude	122 33 38.7 west.
	h. m. s.
Or, in time	8 10 14.6.

It was called Mount Palermo by the United States Exploring Expedition, but is known only by the name here used.

By the old Californians it is called Tamal Pais, because this part of the country was inhabited by the Tamal Indians, who, in 1816, were within the jurisdiction of the mission of San Francisco. The Tamal, Numpal, and Suysum tribes tatooed themselves and spoke the same language; the first lived in the northwest, and the last two in the north.

SIR FRANCIS DRAKE'S BAY.

From the tail of Duxbury reef to the west end of Los Reyes the course is W. ¾ N., and distance 17⅛ miles. To the east end the course is W. by N., distance 14⅜ miles. From Duxbury the shore is bold and compact, running nearly NW. by W. for about 10 miles, then curving regularly to the westward, changing to a low shore, until it reaches its greatest latitude at the Estero de Limantour, which bears N. by E. ½ E. from the east end of Los Reyes, distant three miles; thence the line curves to the southward and southwest, one mile west of the point, leaving a long, high, narrow point stretching to the east, and off which the

breakers extend half a mile. This curving shore line forms Sir Francis Drake's bay, which affords a large and admirable anchorage in heavy northwest weather; and by anchoring close in under the north side of the point, in four or five fathoms, hard bottom, good but contracted anchorage is obtained in southeast gales, as the swell rolling in from the SW. is broken by the reef.

The secondary astronomical station of the Coast Survey was, on the north side of the first small gulley, five-eighths of a mile from the eastern end of the head, and about 40 feet above the water. Its geographical position is:

	′	″	
Latitude	37	59	35.0 north.
Longitude	122	57	36.1 west.
	h	m.	s
Or, in time	8	11	50.4.

The computed magnetic variation in July, 1860, was 15° 58′ east, and its present yearly increase 1′.

Several esteros or lagoons open into the north side of the bay, but their entrances are very narrow and shoal. The largest is the *Estero de Limantour*, which stretches to the northward over three miles, and one of its numerous arms approaches within a mile of the ocean beach, five miles north of Point Reyes head. The entrance to this lagoon has eight feet of water, and is generally marked by breakers on either hand. Coasters can enter with the prevailing northwest wind. It is called Drake's Estero on the Coast Survey chart of Sir Francis Drake's bay, published in 1860. It was named after Limantour, notorious for his attempted great land claim fraud in California. He was a Frenchman, but a citizen of Mexico, and asserted that in trading upon this coast in 1841 he lost the Mexican vessel Ayachuco at the entrance to this estero.

Drake's bay is the Port Francisco of the Spaniards, of about 1595. It was certainly known before the time of Vizcaino, who, having separated from his tender, sought her in Port Francisco, and, according to Venega's account, "to see if anything was to be found of the San Augustine, which, in the year 1595, had, by order of his majesty and the viceroy, been sent from the Philippines by the governor to survey the coast of California, under the direction of Sebastian Rodriguez Cermeñon, a pilot of known abilities, but was driven ashore in this harbor by the violence of the wind; and among others on board the San Augustine was the pilot Francisco Volanos, who was also chief pilot of the squadron." This pilot recognized the bay as being that where he was wrecked.

POINT REYES.

This is the most prominent and remarkable headland north of Point Concepcion. It is distinctly visible from the entrance to San Francisco bay, and the summit of the ridge presents an irregular jagged outline, with the highest part about one-fourth of its length from the western extremity. Its southern face is a precipitous wall of hard sienitic granite, rising boldly from the ocean, attaining an elevation of 597 feet in 300 yards, and stretching nearly in a straight line E. by N. and W. by S. for three miles. This direction is peculiar on the coast, and would not be expected from a consideration of the trend of the coast mountains and of the Farallones, which are in line NW. and SE. On the north side the cape falls away regularly to a low undulating neck of land, cut up by esteros making in from Drake's bay. When made from the southward it is raised as a long, high island; but on approaching it from the westward it is projected upon the mountains running north from Table mountain, and its characteristics are not so readily recognized. Its base is very broken and rocky, and bordered by crags and hundreds of rocks, but may be boldly approached, and eight fathoms, hard bottom, obtained within less than a quarter of a mile. Off the eastern extremity a reef makes out half a mile in continuation of the point. Upon this reef it breaks heavily in bad southerly weather, but nine fathoms can be had close to the breakers. Off the western head a depth of 12 fathoms is found quite near to the rocks.

Vessels bound to San Francisco from the northward always make Los Reyes, and, when up to it, sight two mountains on the southern peninsula of San Francisco as islands. One of these is Blue mountain, 1,100 feet high, and the other, Abbey hill, 1,250 feet.

In 1859, while occupying the Coast Survey station on Point Reyes hill, 1,389 feet in altitude, and 8$\frac{3}{5}$ miles NE. $\frac{1}{2}$ N. from Point Reyes head, we observed a barque, during a perfect calm, having no steerage way, and turning round several times, drift to the northward past Point Reyes head, at the rate of one mile per hour. She was two miles to the westward of the head. On this and subsequent occasions we noticed the discolored water of the Sacramento from San Francisco bay close in shore, and extending to the northward

of the head several miles. Different degrees of discoloration, as of successive ebb tides, were plainly marked.

The light-house of Punta de los Reyes will be placed about a quarter of a mile from the western point. A height of 20 feet above the site selected will command the horizon from east round, seaward, to the north. The ocean face is precipitous, and the light will be at an elevation of about 500 feet above the water.

The geographical position of the site selected is:

Latitude	37	59	39.4 north.
Longitude	123	00	13.3 west.
	h	*m*	*s*
Or, in time	8	12	00.9.

The magnetic variation computed for July, 1860, was 15° 58′ east, with a present yearly increase of 1′.

This headland was discovered by Cabrillo in 1542, and placed by him about the latitude of 40°; but by applying the correction 1° 50′, obtained from his erroneous latitudes of San Diego, Point Concepcion, (Cape Galera,) and Punta Gorda, (San Martin,) the latitude of 40° becomes 38° 10′, which is within ten miles of the latitude of Los Reyes. We believe he called it Cabo Mendozino, in honor of the viceroy of Mexico, who despatched him; but this name was applied to every cape first made by the Spanish galleons on the passage from the Philippines to La Natividad, New Spain. In this region Cabrillo found the mountains covered with snow. There can be little doubt that he also saw the Farallones.

The present name was given by Viscaino, who anchored under the head in January, 1603, whilst searching for the wreck of the San Augustine.

SOUTH FARALLON.

The southern and principal one of the six rocky islets known as the Farallones de los Frayles, lies off the Golden Gate at a distance of 23½ miles; the whole group is disposed in a nearly staight line running NW. from the southern one. This is the largest and highest, extending nearly a mile east and west, attaining an elevation of about 340 feet above the sea, and presenting to the eye a mass of broken, jagged rocks, upon which no vegetation exists, except a few stunted weeds. The rocks are sharp, angular masses, which, becoming detached by the operations of natural causes, roll down upon the more level parts of the islet and cover it with irregular boulders. Notwithstanding that it is the outcrop of an immense dyke of granite, the condition of the superficial portion is such that it could be separated into small fragments by a pick or crowbar. A more desolate and barren place can hardly be imagined. From the hills about the Golden Gate the South Farallon is plainly visible, rising in regular pyramidal form.

Vessels from the westward, running for the Golden Gate, should keep to the southward of the South Farallon, especially in thick weather and at night. To the westward of it a depth of 50 fathoms is obtained at a distance of three miles, shoaling to 20 fathoms in two miles; whereas, inside of it, the bottom is very regular at 30 fathoms for ten miles, and then decreases regularly to the bell-boat. On the SE. side of the island there is said to be good holding-ground in 15 fathoms.

The San Francisco pilot-boats cruise off the island.

An extended and detailed examination around the island has not yet been published.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is X*h*. XXXVII*m*., and the difference between the greatest and least intervals 1*h*. 16*m*. The mean rise and fall of tides is 3.6 feet; of spring tides, 4.4 feet; and of neap tides, 2.8 feet. The mean duration of the flood is 6*h*. 18*m*., and of the ebb 6*h*. 09*m*.

To find the times of high and low waters, first compute them for San Francisco, and from the numbers thus obtained subtract 1*h*. 29*m*. for the South Farallon.

The ship Lucas was wrecked on this islet in a fog, November 9, 1858, and 23 lives were lost.

SOUTH FARALLON LIGHT.

The tower stands on the highest peak of the principal island. It is built of brick, 17 feet in height, and is surmounted by a lantern and illuminating apparatus of the first order of the system of Fresnel. It is a *revolving white light, showing a prolonged flash of* 10 *seconds every minute* throughout the horizon. The time of the flash varies on different nights. In 1859 we found the average time 13 seconds. It is levated about 360 feet above the mean level of the sea, and should be visible, in a favorable state of the atmosphere, from a height of—

10 feet, at a distance of 25.4 miles.
20....do.....do..... 26.9 "
30....do.....do..... 28.1 "
60....do.....do..... 30.7 "

At near distances, under favorable circumstances, the light will not wholly disappear between the intervals of greatest brightness. It is plainly visible from Sulphur Peak, distant 64.4 miles, and 3,471 feet above the sea.

The geographical position of the light-house, as given by the Coast Survey, is:

	° ′ ″
Latitude	37 41 48.8 north.
Longitude	122 59 05.2 west.
	h. m. s.
Or, in time	8 11 56.3.

Magnetic variation 15° 40′ east, in 1857, with a yearly increase of 1′.

The bearings and distances of prominent objects from it are:

North Farallon, N. 64° W., $6\frac{3}{5}$ miles.
Western head of Los Reyes, N. by W. $\frac{2}{3}$ W., $17\frac{3}{4}$ miles.
Point Boneta light house, NE. by E., $23\frac{1}{2}$ miles.
Bell-boat off San Francisco bar, NE. by E. $\frac{1}{2}$ E., $16\frac{1}{2}$ miles.
Point San Pedro, E., $23\frac{1}{2}$ miles.
From abreast Fort Point the light is just visible above the horizon.

Fog-whistle on the South Farallon.—In January, 1859, a fog-whistle, of six inches in diameter, was placed on the south side of the eastern part of the island, about 275 feet from the water. It is erected over a natural hole, in the roof of a subterranean passage, connected with and open to the ocean, and is blown by the rush of air through the passage, caused by the sea breaking into its mouth. The sound should be heard in the vicinity at all times, (its loudness depending upon the height of the tide and the waves,) except about an hour and a half before and after low water, when the sea does not enter the mouth of the passage. It is said to have been heard at a distance of seven or eight miles.

THE MIDDLE FARALLON

is a single rock, between 50 and 60 yards in diameter, and rising 20 or 30 feet above the water. It lies N. 56° W., distant $2\frac{1}{4}$ miles from the light-house on the South Farallon. Its geographical position is latitude 37° 43′ 31.6″ north, and longitude, 123° 00′ 54.9″ west.

THE NORTH FARALLONES

lie nearly in line with each other and the Middle and South Farallones, and consist of a group of four islets, having a pyramidal appearance as their name denotes, and comprised within a space of little more than half a mile square. The northern three are quite high and bold, the highest peak of the middle one attaining an elevation of 166 feet, whilst the southern one of the group is a mere rock of about 35 yards in diameter, and hardly 20 feet above water. Viewed from the southwest or northeast, breakers extend across from the largest islet to the next one southeast, and during a heavy ground swell we have watched it from Point Reyes hill breaking on an isolated sunken rock lying apparently between the northern and largest islet. From certain directions a small pyramidal detached peak shows close to the north side of the northern islet.

The geographical positions and extent of the islet are as follows:

	Latitude. ° ′ ″	Longitude. ° ′ ″	Extent. Yards.
Northern islet	37 46 10.9 north	123 05 25.1 west	160
Middle islet	37 45 52.9 north	123 04 59.8 west	185
Southern islet	37 45 42.9 north	123 04 53.6 west	125
Rock off last	37 45 44.8 north	123 04 41.0 west	35

The northern islet, therefore, bears N. 64° W., distant $6\frac{3}{5}$ miles from the light-house on the South Farallon. From the light-house site of Punta de los Reyes it bears south, distant 14 miles.

To the southward and eastward from the North Farallones, at a distance of two miles, we are informed that a sunken rock exists, having four fathoms water upon it, with kelp around it, except when torn away

by storms. In good weather the fishermen fish around it, but in bad weather the sea breaks upon it. We called attention to this several years ago, and since then have met with a Russian volume of charts, published at New Archangel, in 1848, wherein a rock in this vicinity is marked "overflowed." The Noonday rock, with $4\frac{1}{2}$ fathoms of water upon it, lies W. by N., distant three miles from the North Farrollones, with intervening rocky bottom in 35 fathoms. Between them and Los Reyes the depth increases to 50 fathoms about midway.

The Farallones de los Frayles were discovered by Ferrelo in February, 1543, and he is stated to have seen six islands in this vicinity, one large and five very small, which Cabrillo had passed on the previous voyage. He states that for five days it was impossible to effect a landing upon them on account of the southwest winds and heavy sea.

Sir Francis Drake is the first that specially mentions them, in 1579, as lying off the harbor or bay where he refitted his ships.

In some recent maps they are omitted

NOONDAY ROCK

This danger lies nearly on the prolongation of the line from the South Farallon, through the North Farallones. It is of very limited extent, and is, doubtless, a sharp isolated point of a small ledge, having from 20 to 30 fathoms immediately around it. It is plainly visible when directly over it, and has $3\frac{1}{2}$ fathoms of water upon it at mean low water; but at the extreme low water of spring tides there will be hardly more than four fathoms. In very heavy weather and low water the sea breaks upon it, but this indication seldom exists, and must not be depended upon for ascertaining its position.

From it the following bearings will show its relation to other well-marked and determined points.

Punta de los Reyes, western head, N. 13° 25′ E., distant $13\frac{8}{10}$ miles.

North Farallon, S. 79° 30′ E., distant $3\frac{1}{10}$ miles.

South Farallon light-house, S. 69° 45′ E., distant $9\frac{7}{10}$ miles.

Point Boneta light-house, N. 71° 32′ E., distant $30\frac{3}{10}$ miles.

Boneta light will not be visible from a ship's deck, but may be seen from aloft, under very favorable atmospheric circumstances.

The approximate geographical position of this rock is:

Latitude	37°	47′½ north.
Longitude	123	09 west.

In the description of the South Farallon, and in the directions for approaching San Francisco, we have heretofore advised vessels approaching the Golden Gate at night and in thick weather to keep to the southward of the South Farallon light. This advice has now more significance, and should be followed. With Punta de los Reyes and the Farallones in sight, vessels bound in and running between them should keep the western head of Los Reyes open on a N.NE. course, coming nothing to the eastward, until the North and South Farallones are in range, then bear away for the Golden Gate. In that position the rock will bear SE., distant $2\frac{1}{3}$ miles. Coming from the northwestward at night, vessels should not bring the South Farallon light to bear anything east of SE. by E., which will clear the rock by two miles, and the North Farallones by one mile.

Southwest of the line passing through the Farallones and Noonday rock, the 100-fathom curve is only four miles distant, and the 50-fathom curve only two miles, with very irregular bottom.

Notice of the ledge was first made known in April, 1860, it having been discovered on the 13th of March. The weather was calm, and the pilot boat, drifting with the current, was fishing off the North Farallones in 40 fathoms water. Suddenly the line slackened, and the depth rapidly decreased to ten, and finally to nine fathoms, when it increased again to the first depth. No other examination was made, as the boarding boat was fishing some miles distant. The North Farallones bore E. by S. at an estimated distance of five miles; the single range taken was unavailable for plotting.

On the 2d of January, 1863, the clipper ship Noonday, drawing 21 feet of water, struck twice upon the isolated rock forming the apex of the ledge; passed over it, and within an hour sunk in 40 fathoms of water. At the time of her striking the weather was clear, sea smooth, but with a very heavy swell from the northwest, and the wind from the northwest carrying her towards the Golden Gate, about 9 or 10 knots an

hour, with everything set. The tide was three hours past the higher high water of the day, and 3.1 feet above the plane of reference, which is the mean of the lower low waters. The height of the higher high water of that day was slightly greater than the average of the higher high waters. She reported the rock eight miles from the North Farallones, which bore E. by S. ½ S.

On the 29th of January the position of this danger was first accurately determined by the Coast Survey, and notice thereof immediately published.

NEW SHOAL OFF SAN FRANCISCO ENTRANCE.

It is reported, January, 1863, that a shoal has been discovered about 80 miles southwest from the Southeast Farallon. It is said to have but from five to seven fathoms of water upon it, and lies directly in the track of vessels bound into San Francisco. Its approximate geographical position from the above data is:

Latitude	37° 06′ north.
Longitude	124 22 west.

SHOAL IN THE PACIFIC, OFF THE CALIFORNIA COAST.

In latitude 37° 25′ north, and longitude 137° 30′ west, rocks are reported having but from three to five fathoms of water upon them. This information was obtained in 1855, and failing to ascertain anything more concerning it, is now published to call attention and invite further examination.

POINT TOMALES AND TOMALES BAY.

Northward of Punta de los Reyes we find a long reach of broad white sand beach, backed by sand dunes, and extending in a N. ½ E. direction about 12 miles, curving to the northwest, and changing to a high precipitous coast running to Point Tomales, which bears N. by W. 15 miles from Los Reyes. Three-quarters of a mile before reaching the point, a rocky islet 80 feet in height is seen close in shore. Eight miles above Point Reyes is the opening to an estero, the north point of which is low and sandy. The wider arm runs one mile towards the head of the western branch of the Estero de Limantour, and little more than that distance from it. The other arm runs nearly a mile and a half to the northwestward. The ridge forming Tomales Point and the western shore of Tomales bay is the northern extremity of that starting from Duxbury Point. About 4¼ miles from the point the ridge is 673 feet high, with slightly lower ground a few miles south. It is where the sand dunes strike this ridge that the coast changes its character; thence to the point it is bold and rocky, with breakers about one-third of a mile off the point, and on the prolongation of the ridge, which averages less than three-quarters of a mile in breadth for the last four miles.

The bay of Tomales extends from Tomales Point SE. ¾ E. for 12½ miles, with an everage width of seven-eighths of a mile. The entrance is narrow, and obstructed by a bar having a depth of 10 feet, between sandy lumps of seven feet. The bar lies nearly half a mile east of the extreme point, and 400 yards from the bluffs. It is exposed to the full force of the northwest swell, and with the least swell from seaward it breaks across the whole entrance. For two or three miles this bay is contracted, but has a narrow, deep channel close under the western shore. Four miles within the point lies a small island near the middle of the bay; beyond it the depth of water becomes more regular. Its shores are becoming thickly settled, and trade in agricultural products has increased so much that a small steamer has been put upon the route to San Francisco.

In 1852 the ship Oxford, after getting on the rocks outside of Tomales ridge, was deserted, floated off, drifted into the bay over the bar with the flood tide, grounded on the flats, and at the following high water floated off again; but no one being aboard, she again drifted on the flats and lay inside of Sand Point for some years.

In February, 1857, the waters of the bay changed to a deep purple color, and the fish died in such great numbers that the beaches and water were covered with them.

This bay was known as Port Juan Francisco by the Spaniards when Vancouver visited the coast in 1792.

In old Mexican grants it is called Tamales, and sometimes Tomales. The old Californians invariably pronounce it like the former.

Belcher erroneously designates it as a part of Bodega bay.

The Russians have a chart of it.

De Mofras calls it the Estero Americano, which is another body of water emptying into Bodega bay. He calls Point Tomales Point Bodega.

The topography of its entrance was executed by the Coast Survey in 1853. A map of the whole bay was published in 1861.

BODEGA HEAD.

This point lies N.NW. 18 miles from Los Reyes, and forms the northern point of Bodega bay, considering Tomales Point the southern. The head is two or three hundred feet high, with a slightly rounding summit, and continues of nearly the same height for a mile or two northward, where it changes to a broad sand beach with low country near, but high hills in the back ground. The face of the land about here begins to change from its uniform want of trees to hills partially covered. It has been frequently held out as a warning not to mistake Bodega Head for Punta de los Reyes, but there exists no reasonable ground for raising a question on this subject, although navigators, who have lost or jeopardized vessels, offer as an excuse the great similarity of the coast and headlands to those near the Golden Gate. We have never been able to detect it. The highest part of the head is about 265 feet above the ocean. From an examination of this section we believe that it is the continuation of the Tomales ridge.

The geographical position of the Coast Survey station on the head is:

Latitude	38° 18′ 20″.0 north.
Longitude	123 02 47.2 west.
Or, in time	h. m. s. 8 12 11.1.

This station is one mile from the southern extremity of the point.

The magnetic variation observed near the mouth of the Estero Americano, in July, 1860, was 16° 19′.1 east. The present yearly increase is 1′.

The Russians called this head Cape Romanzoff.

BODEGA BAY.

From Tomales Point to Bodega Head the course is NW. ¾ W., and the distance 4¾ miles. The average width of the bay to the eastward of the above line is 1⅔ mile, with the shore running nearly a parallel course. It is bordered by numerous rocks, is abrupt, and reaches a height of 594 feet less than a mile inland. The anchorage lies between the head and the mouth of the Estero Americano, (called Avatcha by the Russians,) which lies E. 16° N., 2½ miles from the head. One mile west of the estero a low, narrow sand spit 1½ mile long, and covered with bushes, stretches towards the head, within one hundred yards of it, where a passage exists for the waters of the extensive lagoon north of the sand spit, having small and intricate channels, but almost destitute of water at low tides. The *anchorage* is half a mile outside of this passage, and about N. ⅓ E. of the rocky islet, in five or six fathoms, hard bottom of coarse sand and small patches of clay. It is protected by the head and the low rocky islet and reef, about three-quarters of a mile off the southeast face, from the full force of the northwest swell, which generally rolls in disagreeably in the open part of the bay if the weather is heavy. The reef is densely covered with kelp, and the breakers usually indicate its position. Between the islet and the head there is a narrow 4½-fathom passage opening directly upon the anchorage. In coming from the northwest in summer this channel is available; but in beating out it is too contracted to be safe. During the winter season it is necessary to anchor well out, to be ready to slip and run, as the sea-room is very contracted and the swell heavy. Some vessels have ridden out heavy southeasters, but several have been lost. In beating out, the only danger is the reef off the head.

On account of the general depression of the coast hills behind Bodega bay, to about 500 or 600 feet elevation, and the valley in which the Estero Americano lies being perpendicular to the coast line, the summer winds draw in towards the Petaluma valley with great force. The trunks of the oak trees rise straight for about 10 feet, then bend almost at right angles, without a branch for 10 or 15 feet, and terminate in a clump of branches all dragged out by the force of the wind. Fogs are found drawing in sooner and more frequently than upon any other part of the coast.

The country in the vicinity of the bay is very productive, both in the valleys and upon the hills. The produce is placed in lighters at the "port" or embarcadero, about one mile within the lagoon, and carried by the current to the anchorage.

A fine tract of agricultural country stretches behind the coast hills, extending from Russian River valley to Petaluma creek, by which channel the produce of this region finds its way to San Francisco.

The secondary astronomical station of the Coast Survey was upon the western end of the sand spit; its geographical position is:

	°	′	″	
Latitude	38	18	20.6	north.
Longitude	123	02	17.4	west.
	h.	*m*	*s.*	
Or, in time	8	12	09.2.	

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is XI*h.* XVII*m.*, and the difference between the greatest and least intervals is 1*h.* 54*m.* The mean rise and fall of tides is 3.6 feet; of spring tides, 4.7 feet; and of neap tides, 2.7 feet. The mean duration of the flood is 6*h.* 19*m.*, and of the ebb 5*h.* 59*m.*

To find the times of high and low waters, first compute them for San Francisco, and from the numbers thus obtained subtract 49 minutes for Bodega bay.

Bodega bay was discovered by Heceta and Bodega in 1775, and placed in latitude 38° 18′ north. It was partially examined by Mr. Puget, under Vancouver's direction, in 1792.

In 1812, by permission of the Spanish governor of California, it was occupied by the Russian American Company, who afterwards refused to give it up, and retained possession until 1841. They erected two large wooden houses under the bluff, at the entrance to the lagoon; but these buildings were in ruins at the time of our visit in 1853. A recent Russian work (1848) says: "The bay of Bodega (Tuliatœlivo) was fully described in 1819, by Captain Hagemeister. It is similar to the port of Trinidad, in being convenient only during the summer, when the northwest winds blow along the coast; at any other season it is dangerous. Both its indentations within the NW. and SE. headlands are shallow and contracted, and therefore it is necessary to anchor in the open roadstead."

In 1839, under Belcher's orders, Kellett commenced the survey of Bodega, in the schooner Starling, and was soon after joined by the Sulphur.

The line of equal magnetic variation of 16° east crosses the coast line of Bodega bay in latitude 38° 15′, and in latitude 38° 06′ crosses the 124th degree of longitude. This is for January, 1859. The line moves southward about a mile and a half annually.

Fort Ross.—The rocky, contracted, and unsafe anchorage off this place is NW. ¾ N. from Los Reyes, distance 32 miles, and 15 miles from Bodega Head. The large white buildings of the Russians on the rising ground, and about 100 feet above the sea, are the only marks for making it, and the shore is so steep and guarded by rocks and reefs as to render approach dangerous.

No trade is now carried on here.

The approximate geograpical position is:

	°	′	
Latitude	38	30	north.
Longitude	122	13	west.

On some charts it is erroneously placed in Bodega bay, with a large river running from the northward into the bay. Belcher states it to be 30 miles north of Bodega.

The shore between Bodega Head and Fort Ross curves slightly to the eastward of the line joining the two places. Sand dunes commence 1½ mile from the southern point of the head, and extend 2½ miles to the mouth of a small stream called Salmon creek; these dunes are bordered by a broad sand beach. Nine and a half miles from the head the *S'avianska* of the Russians empties into the sea, breaking through the coast hills that here reach an elevation of 2,200 feet. During the summer months a dry bar forms completely across the mouth of the river, so that the travel along the coast passes over it. It requires heavy rains to break through it, and forms again after a few weeks of dry weather. During the summer the bed is dry above Healdsburg, 30 miles from the mouth, and can be forded in several places in that distance. Before breaking through the coast hills it comes from the northward through a broad, fertile valley. The

arroyos and streams opening into the Russian river near the coast are filled with a very dense growth of heavy redwood; and in 1860 a tram road was being graded along the coast to the lagoon inside of Bodega Head to carry the lumber from the mill on the river.

From Ross mountain, 2,198 feet in height, we have frequently watched the discolored water of the river working along close inshore to the northward, and never to the south. The fishermen experience the same eddy current.

This stream is usually known as "Russian river." De Mofras calls it the San Sebastian.

Northward of this river again commence the high coast hills, covered with timber, which gradually approaches the coast, and reaches it about half way to Fort Ross. The Russian vessels used this as a distinctive mark for making that anchorage. Where the timber commences to skirt the coast a bold spur of the mountains comes directly upon the sea. At Fort Ross there is a small extent of open, cultivated ground, moderately low, but backed by the high wooded country. The coast and coast hills to the northward are mostly covered with dense forests of immense redwood, pine, and a thick undergrowth. At one of the Coast Survey mountain stations over 40 trees were cut down that measured from 5½ feet in diameter (spruce) to 8½ feet (redwood).

Two miles above Fort Ross is a small contracted anchorage, called Timber cove, where a great deal of lumber is sawed, and carried by coasters to San Francisco.

Eight miles above Ross is another contracted anchorage, under Salt Point, where coasters load lumber.

From Fort Ross to Punta de Arena the coast is almost straight, running NW. by W. ¼ W. for 37 miles. It is compact and abrupt the whole distance, covered with trees to the water's edge, and backed by an unbroken ridge of hills about 2,000 feet high, and wooded to their summits.

Haven's anchorage.—About 24 miles northwestward along the coast from Fort Ross is a contracted anchorage under high precipitous rocky islets, with a short stretch of beach on the main, affording a boat landing. There is a protection, when anchored close in, against heavy northwest weather; but it would be very difficult to recognize the locality unless the position of a vessel approaching it were accurately determined.

On the top of the bluff, at the north side of a small gulley, a secondary astronomical station of the Coast Survey was established in 1853. Its geographical position is:

Latitude	38°	47′	58.0″	north.
Longitude	123	34	00.8	west.
	h.	*m.*	*s.*	
Or, in time	8	14	16.0.	

Northward of this anchorage high bold rocks line the coast for four or five miles. They are generally known as "Fishing Rocks."

A few miles south of this anchorage is the mouth of the Walalla river, open in the rainy season, but having a dry bar in summer. It rises south of Fort Ross, behind the first range of coast hills. One of the Coast Survey stations on the north side of the river, and three or four miles from the coast, has an elevation of 2,192 feet, and this may be taken as the general height of this coast range.

POINT ARENA.

This is the first prominent headland north of Los Reyes, from which it bears NW. ¼ W., distant 67 miles. Approached either from the northward or southward it presents a long level plateau, stretching out about two miles west of the highlands, and terminating in a perpendicular bluff that averages about 200 feet in height, except the extreme northwest part, which is comparatively low, partially covered with sand, and destitute of trees for some distance inland. When seen from the southward, with the sun shining upon the face of the bluff, it shows remarkably white for the length of two miles. In fact no point upon the coast presents such a bright appearance, or such uniform vertical bluffs, composed of hard rocks, twisted and distorted into many plications. Bold water is found close off the point, outside the kelp, which, stretching strongly to the southward, shows the set and comparative strength of the current. In October, 1857, we judged it to be running at the rate of not less than two miles an hour. In July, 1853, the computed distances between the astronomical stations, compared with the indications of Massey's patent log, showed a current of from one to two miles, running along the coast to the southward.

About two miles southward of the point a small contracted valley opens upon the shore, and off it is an anchorage for small vessels, moderately well protected from the northwest swell, but open to the southwest. Several schooners have gone ashore here. A large bed of kelp lies off the anchorage.

About a mile and a half N. by W. from the point are several rocks showing just above water, and upon which the least swell breaks. These were noticed by Vancouver in October, 1793. When one mile broad off Arena a high, sharp pinnacle rock shows well out from the shore on the horizon to the southward, with some rocky islets inside, and breakers well out beyond the pinnacle rock, yet northward of it; but their distances from shore are probably not so much as a mile.

The approximate geographical position of Punta de Arena is:

	° ′
Latitude	38 57 north.
Longitude	123 45 west.

A recommendation has been made for a *light-house* upon this point, because it is much needed by the mail and coasting steamers and sailing vessels.

The appearance of this and other parts of the coast induced Sir Francis Drake to call the land New Albion, whilst the same appearance and sandy line to the northward of it doubtless led the Spaniards to designate it La Punta de Arena. It suggests an inquiry concerning the numerous Cape Blancos that are found in their voyages and maps.

A view of Punta de Arena is given on the Coast Survey sheet of 1853.

Ten miles above Point Arena is a small stream called the Nevarro, upon which is a lumber mill. Articles floating from this river are found on the coast to the northward of it.

Albion river.—From Point Arena the first point to the northwestward is 24 miles distant, and bearing NW. by N. $\frac{2}{3}$ N. After passing Arena the coast trends to the eastward of north, and for six miles presents a low shore-line with sand beach, changing suddenly to a straight, high bluff shore with a few trees, and backed within half a mile by hills of 2,000 feet, covered to their summits with wood. Sixteen and a half miles from Arena is the mouth of the Albion river, a very small stream, with the barest apology for a harbor at its mouth. A saw-mill upon this stream induces coasters to obtain freights here, but a great many of those trading have been lost. In 1853 the Coast Surveying steamer Active passed in, but broke her anchor on the rocky bottom.

Mendocino bay.—Twenty and a half miles from Arena, and four above Albion river, is a contracted indentation called Mendocino bay, available for a few vessels in summer, but dangerous in winter. The northern and southern points are about three-quarters of a mile apart, and the eastern shore retreats nearly half a mile. At the southern head are several small rocks, and one large islet surrounded by rocks, off which are heavy breakers. Midway between the heads is a small reef upon which the sea breaks heavily, with very little swell. Deep water is found close around this reef. Off the northern head is very bold water close to it. Into the northeast part of the bay enters the river *Noyon*, or Rio Grande, between two and three hundred yards wide, with a good channel on the southern side, a broad sand flat on the northern, and a bar at the mouth with but a few feet of water, and upon which it always breaks. The eastern shore is bold and rocky. In the southeastern part is a sand beach, with a reef extending from its centre.

The bay forms so slight an indentation in the coast-line that it is difficult to find without acquaintance with its minutest peculiarities, as there are no prominent marks by which to determine it. The north head is a table bluff about 60 feet high, and destitute of trees to the northward and some distance inshore. The south bluff is likewise destitute of trees, but more irregular in outline than the other. Vessels bound for it in summer work a little to windward; then run boldly in towards the north point, upon which the houses become recognized, keep as close as possible along the shore, gradually decreasing the distance to 100 yards just off the south end of the point in 6 fathoms, run on about 150 yards past the point, head up handsomely, and anchor in 5 or 6 fathoms hard bottom. It is a bad berth in summer, and in winter a vessel must anchor far enough out to be able to slip her cable and go to sea upon the first appearance of a southeaster. Several vessels have been driven ashore here.

An extensive saw-mill is located on the north side of the river, some distance up; formerly (1853) it was on the north head, and a stationary engine was placed near the mouth of the river to draw loaded cars up the inclined plane, whence they were drawn to the mill. The lumber was slid down chutes into large scows, and carried to the anchorage.

The place is now sometimes called Meiggsville; formerly it was Mendocino City.

The secondary astronomical station of the Coast Survey is on the north head, and its geographical position—

Latitude	39°	18′	06.1″	north.
Longitude	123	47	25.6	west.
	h	m.	s.	
Or, in time	8	15	09.7.	

The computed magnetic variation, 16° 35′ E., July, 1857; increasing about 1′ yearly.

A view of the vicinity of Mendocino bay is given in the Coast Survey reconnaissance sheet of 1853.

From the point just north of Mendocino bay, (the first one made from Arena,) the shore runs nearly straight for 28 miles N. by W. ½ W., being low and bounded by rocks for 12 miles, when the back hills reach the water and present an almost vertical front 2,000 feet in height.

From the deepest part of the bight the general trend of the coast to Cape Mendocino is NW. ¾ W., and distance 45 miles, and for the whole of this distance it is particularly bold and forbidding, the range of hills running parallel to the shore and rising directly from it. It has been found impossible to travel along this stretch of seaboard; and the trail turns well into the interior valleys.

For January, 1859, the line of equal magnetic variation of 17° east crosses the coast-line in latitude 39° 58′, and in latitude 39° 48′ crosses the 125° of longitude. This line moves southward about a mile and a half annually.

SHELTER COVE.

From the compact shore above described a plateau, destitute of wood, and being from 60 to 300 feet in height, makes square out just above latitude 40° N. for a distance of half a mile, affording an anchorage from northwest winds, and may, perhaps, be regarded as a harbor of refuge for small coasters which have experienced heavy weather off Cape Mendocino, and are short of wood and water, both of which may be obtained here from one or two gulches opening upon the sea.

From Point Arena it bears NW. by N. ⅓ N., distant 65 miles. The whole sea-face of the bluff is bounded by thousands of rocks above and below water, and vessels coming from the north for shelter must give it a wide berth, rounding it within one-third of a mile, and anchoring in 5 fathoms, hard bottom, about one-third of a mile from shore. In this position fresh water comes down a ravine bearing about north, and an Indian village existed in 1853 at the bottom of the wooded ravine, a little further to the eastward. There is always a swell here, and boat landing may not be very easy.

The secondary astronomical station of the Coast Survey was on the southeast part of the bluff, about 60 feet above the sea. Its geographical position is:

Latitude	40°	01′	13.7″	north.
Longitude	124	03	02.9	west.
	h.	m.	s.	
Or, in time	8	16	12.2.	

The computed magnetic variation, 17° 02′ east. in July, 1857; increasing about 1′ yearly.

Upon old Spanish charts a point in this vicinity is designated Point Delgado, doubtless referring to it.

La Perouse, 1787, calls it Punta del Gada.

A hydrographic sketch of Shelter cove accompanied the Coast Survey Report for 1854.

PUNTA GORDA

Is 17 miles NW. by W. ½ W. from Shelter cove, and, as its name implies, is a large, bold, rounding point. Half a mile off it lies a large rocky islet, with rocks close inshore, north of the point. From Punta de Arena it bears NW. ¾ N., distant 81 miles, and the line passing tangent to Punta Gorda runs one mile outside of Cape Mendocino.

La Perouse calls Cape Fortunas Punta Gorda.

CAPE MENDOCINO

Is 93 miles NW. $\frac{3}{4}$ N. from Punta de Arena. Here the range of coast hills from the southward appears to meet a range coming from the eastward, forming a mountainous headland of about 3,000 feet high, which is the western limit of the northwest trend of this section of the coast.

The approximate geographical position of the cape is:

Latitude	40° 25′ north.
Longitude	124 22 west.

A *primary sea-coast* light is especially needed at this cape, because it is the point where the coast takes its great change of direction from northwest to nearly north.

About three miles broad off the cape lies a reef, just under water, known as *Blunt's rocks*, or reef, upon which the sea generally breaks. This reef was noticed by Vancouver as being about one league off shore.—(Vol. 1, page 198.) Half way between it and the cape, and a little to the southward, is a sunken rock which has been discovered within the last two or three years, but not yet accurately located. It is called *Fauntleroy's rock*. Steamers have passed dangerously near it, and in 1857 it was distinctly seen almost under the wheel of the steamship Commodore. Vessels can, perhaps, pass over it in smooth weather, but with a heavy sea the water must break.

Such was our description of this rock in 1858.

In January, 1860, the steamship Northerner struck upon it. The weather was slightly hazy; long, large ground-swell from the northwest, no wind, and low tide. She was bound up the coast, and going over 10 knots per hour. As her bow sunk in the trough of the sea a very slight jar was felt forward, exciting no alarm among the uninitiated. The pumps were immediately sounded, and the ship found to be making water very fast. She headed for Humboldt, but was beached north of Cape Fortunas, and went to pieces in a heavy southwest blow that sprang up.

To the southward, and immediately off the pitch of the cape, lie numerous rocks and rocky islets, the latter being large and high, with a peculiar pyramidal or sugar-loaf appearance. None of them seem to be more than half a mile from the shore, which is almost perpendicular and destitute of a beach.

The face of the cape is very steep, rocky, and worn. Above this the general appearance is rolling, and the surface covered with timber. The pyramidal islets off it are very readily distinguished in approaching from the north or south.

A view of the cape is given on the Coast Survey reconnaissance sheet of 1853.

From Cape Mendocino the following are the bearings and distances to headlands to the northward:

Trinidad Head, north, 39 miles.

Redding's rock, N. $\frac{3}{4}$ W., 56 miles.

Crescent City light-house, N. by W., 79½ miles.

Cape Orford, or Blanco, N. by W. $\frac{7}{8}$ W., 145 miles.

The extent of shore-line from Point Boneta to Cape Mendocino is about 224 miles.

It is generally stated that Juan Rodriguez Cabrillo named this cape in honor of Don Antonio de Mendoza, the viceroy of Mexico; but the highest latitude he reached was Punta de los Reyes, to which he in reality applied that name. It is quite probable that under the lee of the rocks off this cape Ferrelo, the pilot and successor of Cabrillo, anchored on the last of February, 1543, and named it Cabo de Fortunas, (Cape of Perils,) although he places his position in latitude 43°. The next day he may have been off Trinidad Head experiencing heavy northerly weather, and his observations might have placed him in latitude 44°, but with his vessels, adverse currents, and a dead beat to windward, he could not have made a degree of latitude in a day. Here he turned back, passed the Golden Gate on March 3, and reached the island of Santa Cruz on the 5th. It is utterly impossible that with his small crazy vessels he could make 800 miles (the distance from latitude 44° to Santa Cruz) in four days.

Seven miles south of Mendocino a small stream called the Mattole empties. Upon the sides of the hills in lower Mattole, and not above a mile from the Pacific, coal oil springs were discovered in 1861. Along the course of this stream are numerous bottom lands under cultivation.

CAPE FORTUNAS, OR FALSE MENDOCINO

Lies northward of Cape Mendocino, distant five or six miles, and is another bold spur of mountainous headland, similar and almost as high as that cape. Between the two the shore recedes slightly, is depressed,

and forms a beach receiving a small stream called Bear or McDonald's creek, coming down through a narrow valley or gulch. Off this cape lie several rocky islets presenting the same peculiarities as those off Mendocino. There is no beach at the base of the almost perpendicular sea face.

The vicinity of these headlands certainly deserves a detailed hydrographic and topographical survey. It is reported that the soundings have been obtained well to the westward of the cape; should such prove correct, the fact will be of importance to vessels, especially steamers, bound north or south, when near the coast and enveloped in fog, as it would enable them to judge of their position and change their course.

After passing it the shore changes to a straight, low, sandy beach, with valleys running some distance inland.

We have ventured to call this headland Cape Fortunas, to avoid the repetition of Mendocino, and to commemorate Ferrelo's discoveries.

La Perouse calls this cape Punta Gorda. He reports seeing a large volcano, in latitude 40° 48′, burning very brightly. By reference to this chart it would appear to have been near this locality and close to the shore. It was, doubtless, the burning of wood upon the summit or face of the mountains; possibly on the high peak 10 miles inland, and now called Mount Pierce.

Eel river is a small stream with a bar at its mouth, and distant 14 miles from Cape Mendocino. It is very contracted and crooked, receiving the waters of a great many sloughs near its mouth, and draining a most fertile valley, which is rapidly filling up with settlers.

An extensive business in salmon fisheries is carried on near the mouth.

The first vessel that entered it was a schooner, in the spring of 1850, when searching for Humboldt bay. She thumped over the bar, which is said to have nine feet of water upon it at high tide. The Indian name for the river is Weé-ot. It rises by two heads in about latitude 39° 30′, about 30 miles from the coast, and runs nearly parallel with it. One head of a small branch called the South fork is only five miles from the coast, a short distance south of Shelter cove.

HUMBOLDT BAY.

The entrance to this bay lies 21 miles from Sugar Loaf islet, off Cape Mendocino; and the bar, N. by E., 22½ miles from Blunt's rocks. The bar is 1¼ mile from the entrance between the sand points, or two miles from the southwest and highest point of Red Bluff, which is the second bluff above Eel river. Like all the bar rivers on this coast, it undergoes irregular changes, depending much upon the prevalence, direction, and strength of the wind. Early in 1851 it bore NW., distant two miles from Red Bluff, and about half a mile from the beach of the north spit. Three and a half fathoms were found upon it, with a width of 250 yards between the three-fathom curves, retaining nearly the same width, and running on a southeast course towards the bluff, but approaching closer to the north than to the south spit. When between the two, the depth of water was increased to 11 fathoms, suddenly shoaling to four fathoms inside. Vessels kept the north spit within 150 to 250 yards on the port hand for two or three miles after entering. In the fall of 1852 the bar was reported to have moved to the northward about its entire width, and the ranges for going in, as laid down by the survey of the previous year, were entirely useless. In the winter of 1853–'54 the bar changed much, and often suddenly. In the spring of 1854 it was more than its previous width to the southward of its position in 1851, and the depth of water had decreased, until in June of that year, when we crossed, it was over half a mile in extent, with only 16 feet of water at high tide. A bare spot then showed at the lowest tides, W.NW. of the end of the south spit. We saw in that year a strange brig thump over the north sands, while on the course prescribed by the sailing directions of 1851. In 1857 less than 13 feet at high tide could be found upon it, and its extent was very much increased. Eventually a deep and narrow channel will be cut through. About 1852 a steam-tug was placed upon the bay, and has rendered the most efficient service in determining the changes of the bar. When vessels are seen approaching the bar a flag is hoisted on Red Bluff, and the tug goes out to take them in. If it is breaking so heavily on the bar that she cannot get through it, and it is yet practicable for the vessel to run in, she takes up a position and hoists her flag as a signal for the vessel to steer for her. She is invaluable in towing out the deeply laden lumber vessels, as the summer winds blow directly in the channel. In June, 1851, upon our first entering this bay, we found a brig, deeply laden with spars, waiting for an opportunity to get out. She had made several attempts to beat through the then narrow channel, but always failed, and had in this manner occupied 31 days. We have laid 14 days off the entrance, and passed in when the water was breaking on the bar. A preliminary chart of the entrance to Humboldt bay was issued from

the Coast Survey Office in 1851. It was subsequently resurveyed, and the chart of 1858 shows that the bar was $1\frac{3}{8}$ mile from the highest part of Red Bluff, which bore E. by S. $\frac{1}{2}$ S. It then had a depth of $3\frac{3}{4}$ fathoms, and a width of 600 yards between the three-fathom lines. North and south breakers marked as usual the boundaries of the channel, which ran straight and close to the south spit.

In April, 1859, we received the following information in regard to it, from one who was with us there in 1851 and 1854: "The bar is now a mile south of where it was in 1854, three-quarters of a mile north of where it was last winter, and has five fathoms upon it. All the north point of the entrance is washed away, including the small lagoon on the inner side."

The best advice we can offer in regard to entering the bay is to wait for the tug.

In 1861 the steamship Columbia was detained in the bay six days by unusually heavy weather; at the same time a lumber-laden barque was unable to cross the bar for 25 days. The first reported case of any vessel being struck by lightning on this coast happened at Humboldt, February 25, 1861.

From experiments made in 1854, we found the ebb current to run 3 miles per hour, with a maximum velocity between 4 and 5 miles.

HUMBOLDT BAY LIGHT-HOUSE.

This building is erected on the north spit, three-quarters of a mile north of the entrance, and about midway between the bay and sea shores. It consists of a keeper's dwelling, of one and a half story, with a tower rising 21 feet above the roof from the centre; both being plastered and whitewashed, and surmounted by an iron lantern painted red. The light is a *fixed white light* of the fourth order of the system of Fresnel, and illuminates the entire horizon. It is elevated 53 feet above high water spring tides, and should be seen in clear weather from a height of—

10 feet at a distance of 12 miles.

20 feet at a distance of $13\frac{1}{2}$ miles.

30 feet at a distance of $14\frac{1}{2}$ miles.

Its geographical position, as determined by the Coast Survey, is:

Latitude	40°	46′	03.6″	north.
Longitude	124	12	21	west.
	h.	m.	s.	
Or, in time	8	16	49.4.	

Magnetic variation, 17° 06′ east, in July, 1853, increasing about 1′ yearly.

The light, which is a secondary sea-coast, was first exhibited December 20, 1856, and shows from sunset to sunrise.

A light on Red Bluff, which is nearly 100 feet high, would always serve as a leading range, as the flag, staff and ensign placed there are now thus used by the pilots. It would be distinguishable readily at sea when the present one might be obscured by the mist hanging over the surf on the beach. During the day the white buildings would be a capital mark against the green hills and trees in the background. This view, now and formerly expressed, has been repeatedly and earnestly urged upon our attention by many captains, merchants, and the pilots of Humboldt bay.

A view of Red Bluff and the back hills is given on the Coast Survey sheet of 1853.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is XII*h.* II*m.*, and the difference between the greatest and least intervals is 1*h.* 11*m.* The mean rise and fall of tides is 4.4 feet; of spring tides, 5.5 feet; and of neap tides, 3.5 feet. The mean duration of the flood is 6*h.* 19*m.*; and of the ebb, 6*h.* 00*m.*

The greatest observed difference between the two low waters of one day was 4.1 feet; and the greatest difference between the higher high and lower low waters of one day was 9.0 feet.

To find the times of high and low waters, first compute the times for Astoria, and from the numbers so obtained subtract 40 minutes for Humboldt bay.

The bay is situated immediately behind the low sand spits and dunes, and extends 9 miles north and 4 miles south of the entrance; being contracted to less than half a mile in width between the south spit and Red Bluff, it then expands to nearly three miles, and runs a mile and a half to the eastward of Table Bluff. The single channel running into this part of the bay divides into two crooked ones, which contain from one

to three fathoms of water; all the rest shows a bare mud flat at low tides. Abreast of the entrance it is nearly a mile in width, with extensive sands bare at low tides, lying midway between the opposite shores, and running nearly parallel with them. To the northward its average width is half a mile for a distance of 3½ miles. It then expands into a large shallow sheet of water, having two or three crooked channels through it, but the greater part being bare at low tides, showing extensive mud flats, bordered by a grassy flat nearly a mile in width. In the channel way close to the north spit, not less than three fathoms may be carried, increasing for three miles to 6½ fathoms. One mile north of the entrance, and on the eastern side, enters a small stream called Elk river. Two miles north of the entrance, and on the east side, is situated the town of *Bucksport*, off which a depth of 3½ fathoms is found within 150 yards of the shore. Vessels are got alongside the saw-mill wharf here at high tide to load, at low tides they rest upon the muddy bottom. The military station of Fort Humboldt is on a reservation on the bluff about 100 feet high, and immediately behind the town. On the same side, and 4 miles north of the entrance, is the town of *Eureka*, off which is a portion of the channel, having nearly 3 fathoms in it, but no channel reaching it having more than 1½ fathom. The town was laid out before this latter fact was discovered. Vessels lie at the wharves, resting on the mud at low tide. Abreast of Eureka lie several low marshy islands cut up by sloughs and ponds. The largest, called Indian island, is about a mile long (NE.) by half a mile in width. It is marked by two hillocks, surmounted by clumps of trees, near which were (1854) several wretched Indian huts. The smaller islands lie between this and the eastern shore and parallel with it. *Arcata*, formerly Uniontown, is situated on the northeast shore of the bay, and can only be reached by boats at high tide. It is the starting point for the Trinity and Klamath mines. From it an extensive wharf stretches far out over the mud flat, which vessels can reach at high tides.

The southern spit from the entrance to Table Bluff does not average one-quarter of a mile in width; is formed of low sand dunes and grassy hillocks, and bordered on the bay side by marsh. At the southern extremity rises *Table Bluff*, which the name well describes, to a height of about 200 feet, its western point nearly reaching the sea beach, and forming a good landmark for making the bay. Five miles east of it the hills commence rising. Abreast of the north end of the south spit rises *Red Bluff*, presenting to the entrance a perpendicular face, composed of sand and gravel colored by the decomposition of iron ore near its surface, which is 96 feet above high water, and destitute of tree or brush. The bay front of the bluff is about one-third of a mile long, gradually declining to the low, flat land to the north, and also falling away to the south and east. On this bluff the pilots have a flag-staff to range with known points of trees beyond, by which they cross the bar and keep the run of its changes. At the base of the highest part of this bluff we discovered, in 1854, a tooth and part of the tusk of the *elephas primigenius*. The low land on the eastern shore above Red Bluff averages half a mile in width, and runs as far as Eureka, gradually changing to marsh, and bounded by plateaus and hills covered with wood. The north spit averages half a mile in width, and its southern extremity is composed of sand dunes and grassy hillocks disposed in a marked manner parallel with the direction of the northwest winds. Two miles from the entrance trees cover the hillocks and run northward one mile, when a space of a mile occurs without them. After that they continue along the shore.

We have already mentioned the situations of three of the towns on Humboldt bay. *Humboldt*, the fourth town, is located on the south side of Red Bluff. It had eight or ten houses in 1854, and was going backward; in 1860 it had two houses. Bucksport has a goodly number of houses and one saw-mill, formed by hauling the steamer Commodore Preble on the beach, and using her engines for motive power. Eureka has eight saw-mills and a grist-mill, and presents a thriving appearance; one of the saw-mills is formed by the steamboat Santa Clara. Arcata has one saw-mill. In 1854 we obtained a statement of the commerce of the bay for a period of eleven months, ending May 31 of that year, from which it appeared that 143 vessels, ranging from 71 to 540 tons, with an aggregate of 22,060 tons, had brought to the bay 3,089 tons of merchandise, and 562 passengers, and taken away 18,932,000 feet of lumber. Since that time other mills have been added, with increased power, and at a low estimate we may safely say that all can turn out an average of 120,000 feet per day. Many of the vessels trading to this bay were ill adapted to contend against the summer winds. The average time of the above vessels from San Francisco was a trifle under 12 days. Some beat up in six days; others required over 20; all, however, are in very light ballast trim. With vessels adapted to the trade, the average time up should not exceed eight days, and the passage to leeward would average about four. The average tonnage had regularly increased, and there had been a decrease in the average length of the passage to the windward.

It has been erroneously asserted that this bay was discovered from sea in April, 1850, and by land in

1849; but the following account from a recent Russian work, (1848,) with an accompanying chart, settles that question:

"About 8½ miles from the port of Trinidad is situated the entrance to the Bay of Indians, called entrance of Rezanof. By the colonial documents of the Russian-American Company, it appears that it was discovered by citizens of the United States. In 1806 there was in it, (on an American vessel,) under command of Vintep, [Vén tep,] a beaver party of Aleutians, under the direction of Slabotchikoff, which was met by the Indians inimically. This bay is not fully described, but it is known that it is very large; somewhat resembles the bay of San Francisco, only the entrance to it for vessels of large class is not convenient, and with strong southwest winds it is even impossible with any vessel. The depth at the entrance is two sajhen, (14 feet,) and then it breaks on the bar."

The present name was given to the bay in 1850, by those rediscovering it from sea.

The Indian name of the bay is Qual-a-waloo.

Mad river is said to empty into the sea about a mile north of Humboldt bay. It averages about 100 yards in width, with a bar at its entrance that prevents egress; but the vast amount of timber in the valley must eventually find a passage through a canal to the northwest point of Humboldt bay. A deep slough rom the latter is said to approach quite close to Mad river, thus favoring the execution of such a project.

This river is the Rio de los Tortolas of Heceta and Bodega, 1775.

TRINIDAD HEAD AND BAY.

Trinidad Head lies N. ½ W., 17½ miles from the bar of Humboldt bay, and north 39 miles from Cape Mendocino. The low sand beach off Humboldt continues past Mad river to within a couple of miles o Trinidad bay, when it changes to a bluff, guarded by innumerable rocks. For the entire distance of the low beach a depth of from 10 to 15 fathoms may be found one mile from the shore.

The bay or roadstead of Trinidad is very contracted; but having deep water, and all dangers visible, forms a moderately good summer anchorage. The "head," forming the western shore of the roadstead, and a prominent mark when seen from close in, is about 375 feet high, covered with a low, thick undergrowth of scrub bushes, has very steep sides, and eight fathoms close to its southern base. Off the western face, for nearly half a mile out, lie several high, rocky islets, with one one-half a mile south of it, but having nine fathoms close to it. From the south face eastward to the three-fathom curve the distance is one mile, and the depth of the bight to the northward of this line is about half a mile, with half a dozen rocks lying outside the three-fathom line, but well above water. In the northern part of the bay there is a sand beach extending about half a mile; thence eastward the shore is very rocky, the bluff being about 300 feet high, and covered with a heavy growth of timber. The town, formerly a place of some promise, fronts on the northwest part of the roadstead, and the boat landing is on the north side of a round knoll making out about 100 yards from the low neck running to the "head." A wharf is now built here, at which vessels lie to load lumber. A very considerable quantity of seaweed lies off the shore.

In working into the anchorage beat in boldly past the outermost rock until the rock just off the eastern side of the head is in range with the knoll (having a few trees upon it) between the town and the head, with the south face of the head bearing W. by N., and anchor in seven fathoms, hard bottom, within one-third of a mile of the rock and head, having the neck visible to the westward of the knoll, and a sugar-loaf rock beyond the neck showing over it. A swell will generally be found setting in. In winter it is a dangerous anchorage, and if a vessel is unluckily caught, her chances of riding out a southeaster are very few. Several Spanish vessels were wrecked here when it was visited by them, and a number of vessels have been lost within the last eight years. In February, 1851, the barque Arcadia was totally lost in a southeast gale, her ground tackle being insufficient to hold her.

A hydrographic sketch of the bay and view of Trinidad Head accompanied the Coast Survey Report for 1851. A view accompanies the reconnaissance sheet of 1853.

The secondary astronomical station of the Coast Survey was on the neck near the town. Its geographical position is:

Latitude	41°	03′	20.0″	north.
Longitude	124	08	08	west.
	h.	m.	s.	
Or, in time	8	16	32.5.	

The town during the winter is nearly deserted, but a brisk trade is carried on in summer. The connexion with San Francisco by steamers is yet uncertain. The land in this vicinity is very rich, and well adapted to agriculture. The redwood trees grow around it, and attain an enormous size. The stump of one which we measured was about 20 feet in diameter, and a dozen trees standing in the vicinity averaged over 10 feet. One is affirmed to be standing on the bank of a small stream at the southeast part of the bay, that measures over 90 feet in circumference. The bark of these trees has a thickness of from eight to fourteen inches; they grow perfectly straight, retaining their thickness to a great height, begin to branch at 50 or 100 feet, and frequently attain 250 feet in height. The forests of this timber, when free from undergrowth, present an imposing sight.

"Port Trinidad" was discovered June 10, 1775, by Heceta and Bodega, and placed in latitude 41° 07′ N. Near it they place a stream which they call the Rio de los Tortolas, or Pigeon river; this is now called Mad river.

It was visited in May, 1793, by Vancouver, who says, (vol. II, page 245:) "In an excursion made by Mr. Menzies to the hill composing the projecting headland that forms the northwest side of the bay, he found, agreeably with Señor Maurelli's description, the [wooden] cross which the Spaniards had erected on their taking possession of the port; and though it was in a certain state of decay, it admitted of his copying the following inscription: '*Carolus III, Dei G. Hyspaniarum Rex.*' "

Vancouver placed it in latitude 41° 04′ N.—(Vol. I, page 200.)

In some American maps antecedent to the Coast Survey determinations on the Pacific the indentation of the coast between Mendocino and Trinidad was called "Bay of Trinidad."

The Indian name of the bay is Shó-ran.

The shore running NW. by N. from Trinidad Head for five miles is remarkably broken and rocky, which induced Vancouver to call its northern extremity *Rocky Point*. He placed it in 41° 08′. About one mile off it lie several rocks that are sometimes known as the "Turtles."

In January, 1603, Vizcaino's vessels separated during heavy weather, and the smaller sailed, under Antonio Flores, the pilot, to the northward in search of Vizcaino; and when in latitude 41°, with a gale from the SW., he ran before it until he found shelter behind a great rock, where he anchored.

From Rocky Point the shore takes a gentle sweep eastward, making its greatest indentation at the north end of the once famous *Gold Bluff*, in latitude 41° 27′ N., and longitude 124° 03′ W.; and then trending westward to Cresent City. Gold Bluff has an extent of 10 miles, and is very bold and high.

Between Rocky Point and Gihon's Bluff, which is the first one to the northward, there is a stretch of low sand beach, immediately behind which is an extensive lagoon several miles in length, and from a quarter to one mile in width. It lies parallel with the beach, and at some seasons is not connected with the ocean, but at others an opening exists at the northern extremity.

The Indian name of this lagoon is Æ-shœ-shó-ran.

Redding's rock lies five miles broad off Gold Bluff, in latitude 41° 21′, and longitude 124° 10′. It is a single large rocky islet about 200 feet high, and reported to have deep water all around it, with no outlying dangers; but its vicinity has not been surveyed. Vancouver places it in latitude 41° 25′ on his chart, and four miles off shore; but in the narrative states the distance at half a league, and that it is half a mile in circuit. His track lies inside of it. We have been informed that a reef, commencing at the shore two miles above the rock, stretches out towards it. The rock received its present name in 1849 or 1850.

KLAMATH RIVER.

The mouth of this river is in latitude 41° 33′ N., longitude 124° 05′ W. It is, perhaps, 200 yards wide, having a long sand spit on the south side running northwest, and parallel to the high hills that form the north shore. South of the entrance for a mile and a half are outlying rocks, and at the north side of the entrance lie several others. It is reported to have 2½ fathoms upon the bar. Upon passing it in 1853, within less than a mile, the sea was breaking across it, and no appearance of a safe channel was presented. Small schooners enter it; but we have been assured that the mouth was completely closed in the winters of 1851 and 1860, and that the bar changes with every change of heavy weather.

McArthur reported in 1850: "The river has 17 feet on the bar at mean low water. It is not difficult of entrance with a good breeze, but very difficult to get out of, the current running so strong that sailing vessels must come out *stern foremost to be steered.*" He did not, however, enter the river. In 1860 the tug from Humboldt bay endeavored to enter, but could not find sufficient water, although it was very smooth; when the swell came in on the second day, she had to throw her remaining freight overboard and put to sea.

Three or four miles northward of the Klamath is a small sharp indentation at the mouth of a gulch, off which lie one large and several small rocks; but from a distance of a mile and a half we were unable to determine whether any stream opened here. It has, however, received the name of False Klamath, because it has misled small coasters seeking for the Klamath, although there is no sand point on either side, as exists at the latter. The State map of California has a creek called Ahmen opening here. The coast continues bold for several miles, when the hills begin to recede and the shores present many pleasant slopes, unincumbered with forests and now under cultivation. The shore is low and regularly sweeps to the westward for a couple of miles, forming the roadstead, which will be next described.

CRESCENT CITY BAY.

This, the most dangerous of the roadsteads usually resorted to on the coast, has acquired much importance on account of the town (Crescent City) being the depot for the supplies of miners working the gold diggings on the Klamath, Trinity, and Salmon rivers. It is filled with sunken rocks and reefs, and has a goodly number showing above water. No vessel should think of gaining an anchorage here without a pilot, or perfect knowledge of the hidden dangers. No sunken rocks are now known to exist outside of the line of visible ones, except one awash, SW. ¾ W., and a little more than half a mile distant from the light-house. A depth of 10 fathoms exists all around it, and seven or eight fathoms outside of the visible rocks. The usual anchorage is on a line between the light-house and the north side of the large islet three-quarters of a mile east of it, in 3¼ fathoms, hard bottom. To reach this position run for the small, round rock bearing S. 55° E., seven-eighths of a mile from the light-house; pass it on the east side, giving it a berth of 100 yards; steer N. by W. ¼ W. for three-eighths of a mile, passing 100 yards on the east of Fauntleroy rock, which is covered at three-quarters flood. If this rock be covered, its position is generally marked by a breaker. It is necessary to keep it close aboard, because there is a sharp bayonet rock having only two feet of water upon it, and 200 yards to the eastward. Head up for the town and anchor in 3¼ fathoms. To enter or leave it at night, as is done by the mail and coasting steamers, requires a perfect local knowledge of the dangers and peculiarities of the landmarks. Coasting steamers, in fine wether, usually anchor close inshore to discharge freight, which is received in lighters.

A wharf has been built out from Battery Point, and landing is now easily effected in good weather. In southeasters the breakers wash over it.

This bay was first surveyed in 1853, and again in 1859, from which our directions are in part drawn up, but principally from our examination in 1857. The following report (1859) will show clearly the dangerous character of the roadstead, and the knowledge required to enter it: "During the progress of the resurvey of Crescent City harbor, we found several new, dangerous rocks; but as they are not in the channels followed by steamers, and do not interfere with the anchorage in use, it does not seem necessary to notice them further in advance of the publication of the chart, as every one trading here knows that vessels drawing over nine feet should be very cautious in venturing out of the beaten track. The rocks at that place are of a peculiar character, standing isolated like bayonets, with their points just below the surface, and ready to pierce any unlucky craft that may encounter them. After we finished the survey, and a fair way had been selected for a sailing line, we discovered a very sharp rock almost directly in the passage, with its point only three feet from the surface, and deep water all around it. This is mentioned to show that, although the greatest care was taken in the survey, the character of the points of rocks is such that it cannot be surprising if new ones be found for several seasons to come."

In summer there is always some swell here, but in winter it rolls in fearfully, and vessels must choose a position to be ready to run to sea at the approach of a southeaster.

Communication is maintained with San Francisco and other ports by mail and coasting steamers, which generally carry as many passengers and as much freight for this place as they carry to the Columbia river.

The town lies NW. from the anchorage, immediately on the low shore; old drift-logs, in some instances, forming the foundation for wooden houses. In August, 1853, there were about 135 houses of all descriptions. In 1860 the population was 553, and the number of houses 176.

The lands adjacent are being cultivated; a grist-mill has been built which turns out 75 barrels of flour per day, and a good trail leads to the "diggings" on the Klamath and Illinois rivers.

The SW. point of the bay is elevated about 25 feet and continues so to the westward. The light-house is erected on the rocky islet about 300 yards from the point, and connected with it at low tides by a broken mass of rocks, over which a single foot-bridge is constructed.

Tides.—The (approximate) corrected establishment, or mean interval between the time of the moon's transit and high water, is XI*h.* XLIV*m.*, and the mean rise and fall of tides, 4.7 feet.

A hydrographic sketch of Crescent City harbor appeared in the Coast Survey Report for 1854, and a map of the harbor and adjacent coast in 1859. A view of Crescent City and its relation to Point St. George is given on the Coast Survey sheet of 1853.

CRESCENT CITY LIGHT-HOUSE.

The building consists of a keeper's dwelling of stone, the natural color (grey,) and one and a half stories high, with a low tower of brick, plastered and whitewashed, rising from the centre and surmounted by an iron lantern, painted red. It is situated at the southwest part of the roadstead on the seaward extremity of the island point, which is here about 45 feet above high water.

The light is a *fixed white light varied by flashes*, of the fourth order of Fresnel. The interval of flash is 1*m.* 30*s.* It illuminates 315° of the horizon, was first exhibited December 10, 1856, and shows from sunset to sunrise. It is 80 feet above high sea level, and should be seen in a favorable state of the atmosphere

From a height of 10 feet at a distance of 14 miles.
20 feet at a distance of 15½ miles.
30 feet at a distance of 16½ miles.

The geographical position of the light, as determined by the Coast Survey, is:

Latitude	41°	44′	34.2″	north.
Longitude	124	11	22	west.
	h.	*m.*	*s.*	
Or, in time	8	16	45.5	

Magnetic variation, 17° 52′ east, July, 1851, with a yearly increase of 1′.

From Cape Mendocino it bears N. by W. 79½ miles.

The secondary astronomical station of the Coast Survey was on the point on the land side of the light-house, near a few Indian huts existing in 1853.

Its geographical position is:

Latitude	41°	44′	44.0″	north.
Longitude	124	11	14	west.
	h.	*m.*	*s.*	
Or, in time	8	16	44.9.	

POINT SAINT GEORGE.

This point lies two miles W. by N. from Crescent City light. It is from 50 to 100 feet high, with table-land some distance back. It is bounded by hundreds of rocks, some of which rise perpendicularly 200 feet from the water. Three or four of the largest present a remarkably white appearance, which serves to distinguish this point. The extensive reef in its vicinity may have led to confusion among the old discoverers, by their confounding it with Cape Orford.

The point may possibly be the Cape San Sebastian of Vizcaino, who, after the separation of his vessels, continued his explorations northward, and, on January 20, 1603, when in latitude 42° N., reached a high white bluff, which he named in honor of the saint of that day. On the day preceding, Antonio Flores, his pilot, in the smaller vessel, supposed himself in latitude 43° N., where the land formed a cape or point, which he called Cape Blanco, and from that point the land ran NW. Near the point he discovered a large and rapid river, which he endeavored to enter, but could not from the force of the current. We are inclined to believe that both names refer to the same cape.

Vizcaino, in January, 1603, gave the name Cabo Blanco de San Sebastian to a cape which he places near latitude 42°.

The present name was given to the cape by Vancouver in 1792. He placed it in latitude 41° 46½′ N.

DRAGON ROCKS.

This name is applied to the rocks and reef extending W.NW. from Point St. George for a distance of six miles. The locality has never been surveyed in detail, but a wide passage exists inside of the reef, and

is invariably used by the mail and coasting steamers, when entering or leaving Crescent City bay. There are 10 or 12 outlying rocks, and many sunken ones, with the passage running between them and those close to shore. This passage is about a mile in width, has 10 fathoms in it, and the general course through is nearly NW. and SE., but not straight. Among the multitude of rocks on the land side of the passage are three very large and prominent ones about 200 feet high. It has been already stated that several of the largest rocky islets have a well-marked white appearance, occasioned in part by the deposits of sea birds.

This name was first given by Vancouver in 1792. The general name now used is Crescent City reef

For January, 1859, *the line of equal magnetic variation* of 18° east crosses the coast line north of Point St. George, in 41° 50′, and in latitude 41° 40′ crosses the 125° of longitude. This line moves southward about a mile and a half annually.

PELICAN BAY.

From Point St. George the coast runs straight for 12 miles N. ½ W.; thence W.NW. for nine miles, forming a deep indentation, called by La Perouse, 1787, Pelican bay, and by Vancouver St. George's bay. On the Coast Survey reconnaissance of it in 1850 it is named Pelican bay. For eight miles from Point St. George the shore is low for some distance back, and fronted by a sand beach to the mouth of a small stream called *Smith's river*. The entrance to this river we looked for in vain from the deck of the steamer, although scarcely two miles off shore, but were able to form a good estimate as to where it should open by the peculiarities of the northern bank, which was a low perpendicular bluff.

Its approximate geographical position is:

Latitude	41° 54′ north.
Longitude	124 11 west.

The "Smith's river" of recent maps and descriptions is a myth. Half way between Crescent City and the mouth of Smith's river there is a small sheet of water called Lake Talawa. North of this small stream the coast acquires an elevation of about one or two hundred feet for a short distance inland, and is bounded by high mountains.

COAST OF OREGON.

The etymology of the name Oregon has not been satisfactorily explained. It is first mentioned by Jonathan Carver in the relation of his trading expedition to the head waters of the Mississippi, between June, 1766, and October, 1768. He did not penetrate beyond the 95° of west longitude, and mentions the name but three times, in the following manner: The "River Oregon, or the River of the West, that falls into the Pacific ocean at the Straits of Annian;" the "Oregon, or the River of the West." He states that Robert Whitworth, in 1774, designed to pursue the same route traversed by himself, "till, having discovered the source of the Oregon, or River of the West, on the other side of the summit of the lands that divide the waters which run into the Gulf of Mexico from those that fall into the Pacific ocean, he would have sailed down that river to the place where it is said to empty itself in the Straits of Annian." This is the extent of his information on the subject, and was derived from Indians and traders.

It will be remembered that Martin d'Aguilar reported to have found, in 1603, a large river emptying into the Pacific in latitude 43°, and which was called the "River of the West."

The theory that the Pen d'Oreilles tribe, inhabiting part of the region between the Columbia river and the Rocky mountains, was originally designated Orejon by the Spaniards, and hence gave the name to the river, is unsatisfactory.

About three miles by the shore to the northward from the deepest part of Pelican bay, the boundary line of California and Oregon, of 42° N. latitude, strikes the coast near a noticeable high pyramidal mound, rising abruptly from the plateau, which is destitute of timber.

CHET-KO RIVER.

Five miles from the deepest part of Pelican bay, and in latitude 42° 01′ N., longitude 124° 15′ W., (both approximate,) empties a stream which is from 50 to 60 yards wide at its mouth, with banks about 100 feet high, and bounded half a mile in shore by very high hills. It appears deep and sluggish,

and in August, 1853, was completely closed at the mouth by a heavy gravel beach. The anchorage off it is open and exposed from west to south, with several reefs in and around it. No survey or reconnaissance has been made. We found Indian huts in great numbers upon both banks, but most of the Indians were engaged higher up the stream in taking salmon.

On the Coast Survey charts of 1853 this stream was marked Illinois river, that being the name applied to it by miners prospecting from Crescent City, whereas the Illinois is the south branch of the Rogue's river. Similar errors have frequently been made on the coast. Some give the Indian name of this stream Chit-ko.

From Point St. George to an arched rock about 40 feet high, in latitude 42° 11′, the course is NW. by N. 27 miles. The coast between the Chetko and the point within a mile of the arch is high, bold, compact, and bordered by vast numbers of rocks, with very deep water close in shore. From this the shore runs nearly NW. by N. ½ N. for 40 miles to Cape Orford, making a long gentle curve of four miles to the eastward, and being in general high, abrupt, and rocky.

A view of the arched rock is given on the Coast Survey sheet of 1853.

ROGUE'S RIVER.

Within the long stretch just referred to is found the entrance of Rogue's river, in latitude 42° 25′ N., and longitude 124° 22′ W., (both approximate,) having a long, low, sandy point on the south side, and a high, steep hill, with two large rocks off its base at the north side. It comes from the interior between high mountains, and it is next to impossible to travel along its course. Just within the entrance and on the north side were large Indian villages in 1853. When passing it in moderate northwest weather the sea was breaking heavily across the bar, and this is reported to be generally the case. It has not been examined or surveyed, and the depth of water on the bar is variously reported from 10 to 18 feet; the former, doubtless, nearer the truth. McArthur reports ten feet on the bar, but that the channel is too narrow for sailing vessels to turn in. In the spring of 1850 the New York pilot-boat W. G. Hagstaff entered the river, and we believe was attacked by the Indians, deserted, plundered, and burnt. The next vessel that entered was the schooner Sam Roberts, in July of the same year, which got out safely. We know of no other vessels ever having made the attempt.

Near the entrance commences the detached deposits of auriferous sand and gravel, which are found northward along the coast to the Coquille river.

The name of the river was suggested by the dishonest propensities of the natives in its vicinity. On the maps it is called Toutounis, and the Too-too-tut-na or Klamet. These names, we judge, have arisen from misapprehension, because the Indians hereabouts, when asked a question which they do not understand, answered toó-ta, toó-ta; toó-ta signifying negation, and rendered more emphatic by repetition. Or the name may be derived from what is called the Too-too-tan village, some distance up the river. That existing (1853) on the north head of the mouth of the river is Tar-shoots. Several campaigns have been made against the Rogue river Indians, and they have been found a warlike and troublesome race; but the manner in which they were treated by some of the early settlers was well calculated to rouse them to a war of retaliation.

ROGUE'S RIVER REEF.

The rocky islets composing this reef are not so large as the Dragon rocks, and run more nearly parallel with the coast line. The southern group of rocks lies W. ½ N., about four miles from the north head of the entrance to Rogue's river, and stretches northward three miles, where a gap occurs between them, and another cluster lying a mile and a half off shore. Off this inner group lie several dangerous sunken rocks, which must be sharply watched from aloft when the sea is not heavy enough to break upon them. As seen from the southward, the inside rock of the outer group shows a perpendicular face eastward, and sloping back to the west. The channel through this reef is perhaps a mile wide, but more dangerous than any other on the coast. No hydrographic survey has been made of it, and it is never used by the coasting steamers. In 1853 the Coast Surveying steamer passed through it. A view of the reef is given on the Coast Survey sheet of 1853.

Abreast of the northern part of this reef is a five-mile stretch of low sand beach, backed by high, rugged, wooded hills, when the shore changes to an abrupt and precipitous face to Port Orford. Many rocks closely border the shore, and five miles south of Port Orford a high rocky islet lies nearly a mile off the base of the hill, about 1,000 feet high.

PORT ORFORD.

This is by far the best summer roadstead on the coast between Los Reyes and the Strait of Juan de Fuca. From the extremity of the SW. point eastward to the main shore the distance is two miles, and from this line the greatest bend of the shore northward the distance is one mile. The soundings within this space range from 16 fathoms close to Tichenor's rock, forming the SW. point of the bay, to three fathoms within one-quarter of a mile of the beach on the northeast side; with five fathoms at the base of the rocky points on the northwest side towards Tichenor's rock. One mile off the shores of the bay the average depth is about 14 fathoms, regularly decreasing inshore.

The point forming the western part of the bay presents a very rugged, precipitous outline, and attains an elevation of 350 feet. Its surface is covered with excellent soil and with a sparse growth of fir. From this point the shore becomes depressed to about 60 feet at the northern or middle part of the shore of the bay, where the town is located. The hills behind are covered with a thick growth of fir and cedar.

The anchorage is usually made with the eastern end of the town bearing north, being just open to the east of a high rock on the beach, in six fathoms water, hard bottom, having a sharp, high point bearing NW. by W. one-quarter of a mile distant, the beach in front of the town distant a quarter of a mile, and three rocks just in the three-fathom line E. by N., distant half a mile. Steamers anchor a little to the eastward of this position, and closer to the town, in four fathoms. Coasters from the south in summer beat up close inshore, stretching inside of the outlying islets to avoid the heavy swell outside. Coming from the northward they keep just outside of a high rock one-third of a mile off the western head, and round Tichenor's rock within half a mile. In winter, anchor far enough out to be ready to put to sea when a southeaster comes up. During a protracted gale in December, 1851, a terrible sea rolled in, that no vessel could have ridden out The old steamer Sea Gull was driven northward, and lost two weeks in regaining her position, and the mail steamer Columbia hardly held her own for many hours off the Orford reef.

The usual landing is between the rock called Battle rock, north of the anchorage, and the point of rock close on its west side. A road is cut from here up to the town, which consists of but a few houses. Sometimes a landing is made on the rocky beach a quarter of a mile westward of Battle rock, in the bight, where a sloping grassy bluff comes to the water; but this landing is over a rocky bottom. A road is cut up the slope to the site of the military post of Port Orford, which is now abandoned.

From "Battle rock" the shore eastward is skirted by sand beach for 1¾ mile to a rough, rocky point called Coal Point. About midway in this distance empties a small creek, whose banks are composed of a deposit of auriferous sand and gravel, the same as found in front of the town abreast of Battle rock, and which has yielded as high as $30 to $40 per diem to each miner. Battle rock was so named, because the first adventurers made a stand against the Indians upon this rock in June, 1851. Coal Point was so named from the reported existence of coal in this vicinity.

Several attempts have been made to open a road from this place to the mines, about 60 or 70 miles eastward, but thus far without success. Several parties have gone through, but could find no direct available route for pack-animals. Upon the opening of such a road it would become a large depot of supply for the interior. In the neighborhood of Port Orford are found immense quantities of the largest and finest white cedar on the coast, and for some years a saw-mill has been in operation, affording a small supply for the San Francisco market of this lumber, unapproachable in quality by any on the Atlantic coast.

The high mountain about 12 miles east of Port Orford is called Pilot Knob.

The primary astronomical station of the Coast Survey, established here in 1851, is on the top of the ridge just west of the town, at a height of 262 feet above the sea, and within a few yards of the western edge of the bluff. Its geographical position is:

Latitude	42°	44′	21.7″	north.
Longitude	124	28	47	west.
	h.	*m.*	*s.*	
Or, in time	8	17	55.2	

Magnetic variation, 18° 29′ east, in November, 1851, with a yearly increase of about 1′.

From this station Tichenor's rock bears S. by W., three-quarters of a mile distant.

The secondary astronomical station (1853) is in front of the town, north of the Battle rock, and within 50 yards of the edge of the bluff. Its geographical position is:

Latitude	42°	44′	28″.2	north.
Longitude	124	28	13	west.
	h.	m.	s.	
Or, in time	8	17	52.8.	

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is XI*h*. XXVI*m*. The mean rise and fall of tides is 5.1 feet, of spring tides, 6.8 feet, and of neap tides, 3.7 feet. The mean duration of the flood is 6*h*. 19*m*., of the ebb, 6*h*. 7*m*., and of the stand, 0*h*. 39*m*. The average difference between the corrected establishment of the a. m. and p. m. tides of the same day is 1*h*. 22*m*. for high water, and 0*h*. 40*m*. for low water. The differences when the moon's declination is greatest are 2*h*. 12*m*., and 1*h*. 28*m*., respectively. The average differences in height of those two tides is 1.4 foot for the high waters, and 2.6 feet for the low waters. When the moon's declination is greatest those differences are 2.3 feet and 3.9 feet, respectively. The average difference of the higher high and lower low waters of the same day is 7.1 feet, and when the moon's declination is greatest, 8.2 feet. The higher high water in the twenty-four hours occurs about 10*h*. 45*m*. after the moon's upper transit, (southing,) when the moon's declination is north, and about 1*h*. 14*m*. before, when south. The lower of the low waters occurs about seven hours after the higher high water. The greatest observed difference between two low waters of one day was 5.5 feet; and the greatest difference between the higher high and lower low waters of one day was 11.0 feet.

To find the times of high and low waters, first compute the times for Astoria, and from the numbers thus obtained subtract 1*h*. 16*m*. for Port Orford.

This bay was called Ewing harbor in 1850 by McArthur, but is now known by no other name than Port Orford, from its proximity to Cape Orford. A sketch of it was published by the Coast Survey Office in 1854.

From the western extremity of Port Orford Cape Orford, or Blanco, bears N W. ½ N., distant 6 miles, the shore line between them curving eastward about a mile. Immediately north of Port Orford it is composed of a very broad loose sand beach, backed by a long uniform sand ridge of 100 feet height, covered with grass, fern, sallal bushes, and a few firs; while behind this the ground falls and forms lagoons and marshes. This ridge extends nearly to the mouth of a stream called *Elk river*, 3½ miles from Tichenor's rock. This narrow stream, fordable at its mouth at low tides, comes for miles through broad marshes covered with fir and white cedar, and an almost impenetrable undergrowth. The south side at the mouth is low, sandy, and flat; the north side, a slope rising from the marsh inshore and terminating on the beach in a perpendicular bluff, averaging 100 feet high, covered with timber to its very edge for a couple of miles, when the timber retreats some distance inland. The face of this bluff exhibits vast numbers of fossil shells in the sandstone. At its base a sand beach exists which may be travelled at low water.

At the mouth of Elk river, a bottle, nearly buried in the sand, was picked up on the 18th of May, 1860, with a memorandum, stating that it had been thrown from the steamship Brother Jonathan in latitude 42° 00′, longitude 124° 50′, on the 23d of March, 1860, the wind at the time strong from the south. It had travelled nearly north about 50 miles.

CAPE ORFORD, OR BLANCO.

In making this cape from the northward or southward it presents a great similarity to Point Concepcion, appearing first as an island, because the neck connecting it with the main is comparatively low, flat, and destitute of trees, with which the cape is heavily covered to the edge of the cliff. It is, perhaps, over 200 feet high, but the trees upon it make it appear at least 100 feet more. The sides are very steep, and worn away by the action of the sea, showing a dull whitish appearence usually, but bright when the sun is shining upon them. At the base are many black rocks and ledges stretching out to form the inner part of Orford reef. In the bend, southeast of the cape, rises a large, high, single rock, about 100 yards from the beach.

The approximate geographical position of the cape is:

Latitude	42°	50′	north.
Longitude	124	30	west.

Being thus the most western part of the main land until we reach latitude 47° 50′.

From it Cape Mendocino bears S. by E. $\frac{7}{8}$ E., distant 145 miles; Cape Disappointment light, at the north head of the entrance to the Columbia, N. by W. $\frac{1}{8}$ W., distant 207 miles; and Tatoosh island light, off Cape Flattery, N. NW., 332 miles. From the line joining Blanco and Cape Disappointment the coast does not, in any place, leave it more than 12 miles.

A light of the first order is required upon this cape, or upon one of the rocky islets of the outlying reef.

Upon old Spanish maps a cape near this latitude has been called Blanco, from the assertion that Antonio Flores discovered and so named it in 1603. He says that from this cape the coast trends northwest, and near it he found a large river, which he tried to enter, but could not on account of the strong current running out.

At that time the magnetic declination must have been about zero, and perhaps several degrees west. Assuming it as zero, the coast thence northward for nearly 100 miles trended N. by E. $\frac{1}{2}$ E.

The name Orford was given by Vancouver in 1792, and placed by him in latitude 42° 52′. On the western coast this name is now almost invariably used.

A view of Cape Orford is given on the Coast Survey sheet of 1853.

ORFORD REEF.

About 4 miles off the coast, between Port and Cape Orford, lies a group of rocky islets and sunken rocks.

There are seven large high ones within an area of one square mile, with small ones that are just awash, and others upon which the sea only breaks in very heavy weather.

The southeastern rock is called the "Fin rock," and has a perpendicular face to the southwest, with a sloping surface to the northeast. Near it are several low black rocks. The Fin rock lies W. $\frac{3}{4}$ N., distant $4\frac{1}{3}$ miles from the western point of Port Orford, and the general direction of the six others is N.NW. from Fin rock. West from Port Orford, and distant $4\frac{1}{2}$ miles, is a small black rock, and near it a smaller one, upon which the sea breaks only occasionally. W. by N. $\frac{1}{2}$ N., distant $4\frac{3}{4}$ miles from Port Orford, lies the largest of the seven islets, rising up with high and nearly perpendicular sides. On the same course, and a mile and a quarter further out, is a small rock, and half way between them a rock awash. This is the northern limit of the group.

Stretching S.SW. for a mile and a third from Cape Orford are numerous rocky islets and sunken rocks, with large fields of kelp; but ceasing at that distance, a passage is left one and half mile wide between them and the northern islets of the other group. The course through the middle of the passage, clearing the rock called Klooqueh, off the western point of Port Orford, is NW. by W., with ten fathoms rocky bottom on the shoalest part of that line.

This passage is in constant use by mail and coasting steamers, but the hydrography of the reef has not yet been executed, and only a preliminary examination of the position of the outer rocks. Although the general trend of the southern group is N.NW., it is very probable that they are a continuation of the reef making out from the cape.

When coming down this coast, in 1787, La Perouse says his latitude at noon was 42° 58′ 56″, and that two hours afterwards he was abreast of nine small islands or rocks lying about a league off Cape Blanco, which bore NE. by E. He called them the Necker islands; evidently the group forming the Orford reef.

One mile north of Cape Orford empties a small stream having a great number of rocks off its mouth. In 1851 it was usually called Sikhs river, the Chinook "jargon" name for friend. On some maps we find a stream near this locality called Sequalchin river. The village upon the Sikhs is called Te-chéh-quut.

Ten miles north of Cape Orford La Perouse places a cape called Toledo, but no headland exists between Orford and the south head of the Coquille, although a small stream called Flora's creek empties upon the coast about half way between them.

From Point Boneta to Cape Orford the extent of shore-line is 388 miles, Boneta to Mendocino being 223 miles.

General features.—From Cape Mendocino the hills upon the seaboard range from 2,000 to 3,000 feet high, running parallel with the coast at a distance of from 3 to 5 miles, receding somewhat at the Eel river valley and Point St. George, and at other points coming abruptly to the ocean. The whole face of the country is covered with dense forests, and offers almost insurmountable obstacles to the opening of roads intended to strike the trail leading along the valleys of the Sacramento and Wallamut.

Northward of Cape Orford the appearance and nature of the coast assumes a marked change. Long reaches of low white sand beach occur, with sand dunes, broken by bold rocky headlands, and backed by high

irregular ridges of mountains. On the sea-face and southern sides of many of these prominent points no timber grows, and they present a bright, lively green of fern, grass, and bushes. The general altitude of the mountains appears the same as to the southward.

COQUILLE RIVER.

From Cape Orford to the mouth of the Coquille, in latitude 43° 07′, the coast runs exactly north for 17 miles, with a slight curve of a mile and a half eastward, and a short distance north of Orford consists of a low sand beach, immediately behind which are long shallow lagoons receiving the water from the mountains, but having no visible outlet to the sea. Along this shore the soundings range from 7 to 15 fathoms at a distance of a mile.

The south point of the entrance to this river is a high bluff headland, whilst the north point is a long, low, narrow spit of sand, overlapping, as it were, the southern head, so that the channel runs parallel with and close under it, (1851.) A short distance off it lie several rocks, but not of sufficient size to lessen the western swell which breaks continually across the bar.

In the winter of 1851 the boats of the propeller Sea Gull effected a landing near the rocks, but it was attended with danger; subsequently boats were carried by land from Port Orford. The widest part of the mouth is less than 200 yards, after which the river spreads out into a large sheet of shallow water, about two miles long by three quarters of a mile broad, and bounded by low ground. Into the northeast part of this lagoon enters the river, which has been followed a distance of about 30 miles in a northeasterly direction, and having a depth throughout of not less than 15 feet, and an average width of 40 yards. It drains a very fertile region, densely covered with many varieties of wood. Numerous Indian encampments were found along its banks from the mouth, and quite extensive fish weirs were discovered and destroyed. About 15 miles from its mouth there is a portage of 1½ mile to Koos river.

The hydrographic reconnaissance of this river in 1859 by the Coast Survey shows only 3 feet of water on the bar, and it is reported inaccessible for vessels of ordinary draught. The north point is a long stretch of dreary sand dunes, and has a single bold rock at its southern extremity. The channel makes out straight from the southern head, and north of the rocks (1859.)

The approximate geographical position of its entrance is:

	° ′
Latitude	43 07 north.
Longitude	124 24 west.

Tides.—The (approximate) corrected establishment is XI*h.* XXX*m.*, and the mean rise and fall of tides 5.0 feet.

A reconnaissance of the entrance and part of the river was published by the Coast Survey in 1861.

When off the entrance in 1854 we saw about a dozen houses which had been built by the miners engaged in washing the auriferous sand and gravel at the back of the beach. In approaching this coast we encountered a very heavy swell, with the water changing to a dark brown color, and after passing through it tacked off shore, hove to, and sounded near its outer limit, but found no bottom with 84 fathoms of line.

The alleged depredations of the Indians in this section led to a campaign against them in 1851.

Some recent maps have a river here called the Soquils, and one within a short distance called the Cotamyts, but no such stream exists in this vicinity.

CAPE GREGORY.

Between the Coquille river and this headland we find another low sand beach for ten miles to the southern part of Gregory, which rises up very precipitously; the hill attaining perhaps 2,000 feet elevation two miles back, runs in a straight line northward for three or four miles, and bounded by many rocks, slopes to the northward to a sharp perpendicular point, about 60 feet high, and peculiarly cut and worn by the action of the sea. Thence it takes a sharp turn to the E.NE. for two miles, to the entrance to Koos bay. The cape, as seen from the southward, shows a couple of rocks a short distance from its western point. Along the low shore soundings in 10 fathoms are found one mile off. We have been informed that vessels anchoring close under the north face of the cape may ride out heavy southeast gales. If so, it is very important, no other place between Sir Francis Drake's and Neé-ah bay, except, perhaps, under Destruction island, affording that protection. If a southeaster should haul to the SW., and then NW., as they usually do, the chances of getting out would be very few.

The approximate geographical position of the NW. point of the cape is:

	° ′
Latitude	43 20½ north.
Longitude	124 22¼ west.

And it bears north 30 miles from Cape Orford.

It was named by Captain Cook, who placed it by bearings in latitude 43° 30′, and is described by him as follows: "This point is rendered remarkable by the land of it rising immediately from the sea to a tolerable height, and that on each side of it is very low." Vancouver placed it in 43° 23′.

It is sometimes called by the recent appellation of Arago, which has been adopted on the Coast Survey charts. It is known by both on the western coast.

A view of it is given on the Coast Survey sheet of 1853.

KOOS BAY.

Nearly 2 miles E.NE. of the northern extremity of Cape Gregory is the wide and well-marked entrance to Koos bay. The south point, named Koos Head, is high and bold, being the base of the hills forming the cape, whilst the north point is low and sandy, with shifting sand dunes that reach 100 feet in height. In 1861 a narrow channel cut across the north point, forming a tolerably large island, which was washed away before the close of the season. Such changes are constantly taking place, and involve changes in the bar and channel. The points lie nearly north and south of each other, and about three-quarters of a mile apart. The bar (1861) lies N. 62° W. one mile from Koos Head; N. 35° E. 1¾ mile from Cape Gregory, and its width between the 12 feet lines on the north and south sides is only 150 yards, with a maximum depth of 13 feet. Thence the channel, increasing in width, runs straight to the north tangent of the head, with 10 fathoms of water at that point. In 1853 and 1854 a depth of only 9 to 9½ feet could be found on the bar. During the working season of 1861 the bar moved to the northward, thus indicating great changes in this as in all other river bars on the coast. Vessels enter and leave on the flood tide because the bar is smoother; with the ebb there is a heavy break, unless the sea be remarkably smooth. The currents run very strongly, as might be supposed, from the extent of the bay and the size of the channel.

We have seen the sea breaking completely across the entrance in moderate northwest weather, and know that the mail steamer has tried to enter, but upon seeing the danger would not take the risk. In 1861 the party examining it could get but one day's work on the bar during several months. In October, 1862, the surveying brig Fauntleroy could not enter.

Traffic is drawn hither by the mining of lignite, which is carried to the San Francisco market. It has been found unfit for steamship consumption, but is used for small stationary engines and domestic purposes. The geology of the country does not give promise of coal. A tug-boat is employed at the entrance for the towing of vessels over the bar. The saw-mills on the bay turn out about 15,000 feet of lumber daily.

Tides.—The corrected establishment or mean interval between the time of the moon's transit and the time of high water is XI*h*. XXVI*m*. The mean rise and fall of tides is 5.1 feet, of spring tides 6.8 feet, and of neap tides 3.7 feet. The mean duration of the flood is 6*h*. 19*m*., of the ebb 6*h*. 07*m*., and of the stand 0*h*. 39*m*.

The approximate geographical position of Koos Head is:

	° ′ ″
Latitude	43 21 04 north.
Longitude	124 18 west.

The computed magnetic variation for December, 1861, is 18° 52′ east, with a yearly increase of 1′.

The bay is very irregular in outline, and its general shape is somewhat like the letter U, with the convexity to the north. One small branch stretches southward behind Koos Head; it is called the south slough, and has but two or three feet of water in it. North of the entrance the bay proper begins, and has a good depth of water. Abreast of the north point the width is 600 yards, and the depth from three to seven fathoms; thence northward it increases in width to nearly a mile, and runs very straight on a N. by E. ½ E. course. The channel runs on the eastern side of this part, the western half being filled with sand flats and shallows. A sunken rock, called the Fearless rock, is on the eastern side of the channel, abreast of the upper part of the rocky shore. The whole length of the bay is believed to be about 25 miles, the head of it being a little further south than the entrance. Koos river empties into the head of the bay, and will give passage to boats for twenty miles from its mouth, where a small slough that empties into the Coquille river is so near as to

leave a portage of only a mile and a half between the two waters, and about 15 miles from the mouth of the Coquille.

Excepting the peninsula, which forms the western shore of the bay north of the entrance, the entire country is an immense forest of various kinds of pine. No land for cultivation is found without clearing, and even on Koos river the bottom lands, which afford excellent soil, have to be cleared of the thick growth of laurel, maple, and myrtle. The coal mines are beyond the great bend, near the head of the bay, and on the western side.

The name Koos is that approaching nearest the Indian pronunciation of the word. On some maps we find a small stream called Cahoos, emptying just south of Cape Gregory. The Coast Survey chart of the bay was published in 1861.

The word Koos signifies, in the Too-too-tan language, a lake, lagoon, or landlocked bay. Duflôt de Mofras very amusingly translates it R. des Vaches.

In January, 1859, the line of *equal magnetic variation* of 19° east crosses the coast-line in latitude 43° 39′, and in latitude 43° 29′ crosses the 125° of longitude. This line moves annually southward about 1½ mile.

UMPQUAH RIVER.

North of Koos bay to the Umpquah river is another straight, low sand beach, with sand dunes, backed by a high ridge of hills densely timbered. The shore runs nearly north, presenting a very white appearance when the sun shines upon it, and having from 10 to 15 fathoms of water one mile off the beach. The southern point of the entrance to the river is a marked spur of the mountains from the southeast, and is bordered by sand dunes. The north side of the entrance is a long range of white shifting sand hills, running with the coast for two miles, and suddenly changing to high, rocky hills covered with wood. The river is the largest stream entering the Pacific between the Sacramento and Columbia rivers. It is 51 miles N. ⅓ W. from Cape Orford, and 21 miles north of Cape Gregory. The lower reach of the river is long and narrow, running nearly north for 6 miles; bordered on the south side by a rocky, wooded shore; on the north, for two miles, by loose sand hills, changing after the first mile to sand sparsely covered with coarse grass, bushes, and fir, and in four miles to steep, high, rocky banks covered with large trees. An immense flat, mostly bare at low water, stretches south from the north point to within 300 yards of the south side of the entrance, through which narrow space runs the channel, having (1853) a bar with only 13 feet upon it, and less than 100 yards wide. From the bar the point of bluff, just inside the entrance, bears NE. by E., and is distant 1¼ mile. About 1851 or 1852 two range marks were placed on the south shore for running in by, and they are frequently referred to as data by which to trace the changes of the bar; but the captain who erected them has assured us that the bar was not on their range, but to the southward of it.

Buoys for crossing the bar.—In January, 1858, it was announced that the bar had been marked by buoys. Two third class nun-buoys, painted white, with white and black perpendicular stripes, are placed in line with the light-house, which bears from them E. by N. ¼ N. The inner buoy is just within the bar, and in 3½ fathoms at mean low water, and can be passed on either hand, but only close to it. The outer buoy is just outside the bar, in 10 fathoms at the same stage of the tide, and can also be passed on either hand. Keeping the two buoys in range with the light-house, 14 feet may be carried over the bar at mean low water.

The above directions show that the bar of the river has moved about 400 yards to the northward of its position, as determined by the hydrographic survey of 1853, and has, moreover, deepened. In light weather it can be readily determined by the breakers on each side, but with a heavy swell the sea is terrific. In October, 1852, the Coast Surveying steamer Active lay off the bar two days trying to get in, but found it impracticable. Several steamers have thumped heavily on the bar, one nearly carrying away her stern-post, and in 1858 the mail steamship Columbia in coming out had her decks swept fore and aft by the huge combers rolling in like high walls. In January, 1861, when going in, this same steamer suffered still more terribly. Several vessels have been lost at its entrance, and within a very recent period no pilots belonged to the river, because the trade was too small to pay.

During the early part of November, 1858, the bar at the entrance to the Umpquah changed greatly, and the depth of water upon it was so much decreased that the steamship Columbia, which thumped over it, could not leave the river for several weeks. Upon sounding at the entrance it was found that the channel across the bar had moved about half a mile northward of its former position.

UMPQUAH RIVER LIGHT-HOUSE.

The light-house is erected on the south side of the entrance, close to the beach, which is of shifting sand. The structure consists of a keeper's dwelling of stone, with a whitewashed tower of brick rising above it, and surmounted by an iron lantern painted red, the entire height being 92 feet, and the height of the light 100 feet above the mean sea level. The light is a *fixed white light* of the third order of the system of Fresnel. It was first exhibited October 10, 1857, and shows every night from sunset to sunrise. In an ordinary state of the atmosphere it should be seen—

From a height of 10 feet at a distance of 15 miles.
20 feet at a distance of 16½ miles.
30 feet at a distance of 17¾ miles.

In the day time the tower will show projected against the dark green fir on the hills behind it, and with the sand dunes to the north be a capital mark for making the river.

The geographical position of the light, as determined by the Coast Survey, is:

	° ′ ″
Latitude	43 40 18.5 north.
Longitude	124 11 00.3 west.
	h. m. s.
Or, in time	8 16 44.2

Computed magnetic variation 18° 55′ east, in July, 1851, with a yearly increase of 1′.

From the bar the light bears E. by N. ¼ N., distant about a mile, (1858.) After crossing the bar the channel, when approaching the light-house, runs close to the south shore, and increases in depth from 3½ fathoms to 13 off the point of bluff. Abreast of the meeting of the sand beach and bluff on the south side, lies a rock, visible at extreme low tide, upon the three-fathom line. It is not laid down on any chart, nor has its position been accurately determined. It has deep water around it. From the point of bluff vessels steer across the river to strike the east side of the north point about one-third of a mile from its extremity, then haul across E.NE. to the other shore, close along which the channel runs. This course takes them clear of a flat and rocks in mid-river, and bearing E.NE. from the south end of the north point, and north five-eighths of a mile from the point of bluff on the south side. The small indentation of the shore-line on the right, after making the first stretch from the point of bluff, is called Winchester bay, having no water, and being but an extensive mud flat. Three miles inside the light-house the river continues half a mile wide, then expands to a mile, and is filled with numerous extensive sand and mud flats. Five miles from the light-house it bends sharply to the eastward.

A preliminary chart of the entrance to Umpquah river was issued from the Coast Survey office in 1854.

The secondary astronomical station of the Coast Survey was on the west side of the river, on the edge of the first grove of fir, and one mile from the end of the north point. Its geographical position is:

	° ′ ″
Latitude	43 41 45.3 north.
Longitude	124 09 57.0 west.
	h. m. s.
Or, in time	8 16 39.8.

This river is said to drain an extremely fertile region, abounding in prairie land well adapted to agriculture and grazing. Ross Cox mentions a pine tree discovered in the Umpquah valley measuring 216 feet to its lowest branches, and being 57 feet in circumference.

The Indian name for the river below the rapids is Kah-la-wat-set, and to the upper part they apply the name Umpt'quah.

The first vessel we know of entering it was the schooner Sam Roberts, August 4, 1850, after coming out of Rogue's river.

This river is sometimes supposed to be the river discovered by Flores in 1603, and afterwards referred to as the "River of the West." Carver, in his narrative, refers three times to the "Oregon, or River of the West."

From the Umpquah the coast runs in a remarkably straight line N. by W. ½ W. to the south point of the entrance to the Columbia river, in no case varying more than three miles eastward of the line joining these two places.

Heceta Bank.—NW. by N., distant 66 miles from Cape Orford, is the southern end of a bank extending parallel with the coast for 30 miles, and about the same distance from it. The least depth yet discovered upon it is 43 fathoms, and the nature of the bottom very variable, there being blue mud, coarse blue sand, coral, pebbles, gravel, mud, and shells. Coasting vessels have often reported passing over localities having a heavy swell upon them, and one frequently so reported near the Umpquah led to the examination which discovered this bank. When Heceta was upon this coast, and in this vicinity, he said: "On Sunday I found great differences [of depth;] at seven leagues I got bottom at 80 fathoms; and nearer the coast I sometimes found no bottom." Should a thorough examination of his discoveries here satisfactorily show that he did really cross this or any yet undiscovered adjacent bank, it would be a tribute to his explorations on this coast to apply his name to it.

CAPE PERPETUA.

After leaving the Umpquah two or three miles, a bold rocky coast, with high steep hills covered with timber, runs straight for about eight miles, changing to low sandy beach with sand dunes, backed by a high ridge of hills. This continues for 15 miles, when the hills stretch out to the shore and crowd upon it for 13 miles, to end abruptly in steep bluffs forming Cape Perpetua, which is 39 miles N. by W. ½ W. from Umpquah light, with an approximate geographical position of latitude 44° 19′, longitude 124° 06′. The face of the cape is nearly five miles long, with very slight projection from the straight trend of the shore. It is very high, and has a regular although steep descent to the shore, bringing the trees to its very edge.

From the Umpquah to Perpetua, at a distance of a mile from the shore, soundings are laid down from 8 to 14 fathoms.

This cape was named by Cook in 1778, and by bearings placed in latitude 44° 06′. Vancouver, in 1792, gave its position in latitude 44° 12′.

In recent maps we find a small stream opening south of Cape Perpetua, called the Sciisteum river. We could not detect it in 1853 from the distance of a mile, but believe there is a stream with the name of Scius-clau, (pronounced Sai-yusé-claw,) emptying about 25 miles above the Umpquah.

To the northward of Perpetua the coast range of hills is cut by numerous valleys, through which flow many small streams to the ocean.

Yaquinnah river.—Nine miles north of Perpetua is the mouth of a stream believed to be the Yaquinnah. It is said to expand into a bay, three miles long by 1½ wide running nearly east, and very much contracted at the middle, where a small islet exists. The south head to the entrance is formed by a spur of the hills from Perpetua. The north point has likewise a bold head with a low sand spit stretching south half a mile. The entrance is in latitude 44° 27′ north, (approximate.)

Recent maps place the Alciyco river about this latitude. No name is given in the last Coast Survey reconnaissance, and it was not seen at all by McArthur in 1850.

The names of the streams hence to the northward are very conflicting, and will continue so until a land exploration is made along the seaboard for determining their peculiarities and the latitudes of their mouths.

Celetse river.—North of Perpetua the shore continues straight, high, and bold for five miles, when a cluster of rocks occur, and the bluff changes to low sand beach, running nearly to the mouth of a small stream, about five miles south of Cape Foulweather, called the Alseya on the Coast Survey reconnaissance of 1850, and the Celetse on the original sheets of 1853. This name is the proper one. The north head, which is bold, has a rock close under it. Thence the shore is low and sandy to Foulweather. The country in the interior is very broken and mountainous, and covered with wood.

CAPE FOULWEATHER.

From Perpetua to this cape the soundings range from 7 to 12 fathoms about a mile from shore. The cape is in latitude 44° 45′ north, and longitude 124° 04′ west, and forms a high, bold headland, half a mile in width, jutting out about half a mile from the low beach, and backed by high mountains. It is covered with wood, and has several small rocks on its southwest face, with one rocky islet a mile from it. To the northward of the cape are three rocky islets standing a short distance from the low beach, and readily distinguished by being projected against it. In August, 1853, the astronomical party of the coast survey was very desirous of effecting a landing on or near this cape, but the sea was rolling in too heavily to warrant the attempt. There was no appearance of a landing being at all feasible, except in remarkably quiet weather.

This cape was named by Cook on the day he made the coast, March 6, 1778, but the point of the headland, so called on the Coast Survey reconnaissance of 1853, is not that referred to by him. At noon he was in latitude 44° 33′, and the land extended from NE. ½ N. to SE. by S., about eight leagues distant. In this situation he had 73 fathoms over a muddy bottom, and 90 fathoms a league further off shore. The land he describes of moderate height, diversified by hills and valleys, and principally covered with wood. No striking object presented itself, except a high hill with a flat summit, which bore east from him at noon. This may have been what he subsequently called Cape Perpetua. At the northern extreme the land formed a point, which he named Cape Foulweather, from the exceeding bad weather he met with soon after. The expression "northern extreme" has led some geographers to place the cape as high as latitude 45½°, but he judged the Foulweather he named to be in 44° 55′. Being here driven off the coast by continued bad weather, he had no opportunity to verify his position, and did not sight the land again until in latitude 47° 05′, thus passing by the entrance to the Columbia. Vancouver places it in latitude 44° 49′. Both of these determinations evidently refer to the northern part of the high land.

Nekas river.—Soon after passing Foulweather the shore becomes abrupt and moderately high, with an increased depth of water immediately off it. Four miles south of the Nekas, which is in latitude 44° 56′, it changes to low sand dunes stretching into a narrow point, forming the south point of the stream, while the north point is a low bluff. The entrance is very narrow and shoal, and inside the river is reported to spread out into a bay of about a mile in extent, and to receive the waters of a stream draining a valley coming from the eastward.

The name is that used on the Coast Survey charts of 1850 and 1853. Previous maps have a small stream emptying near this, called the Cowes river. De Mofras calls it the Yacoun.

From the Nekas to Cape Lookout the distance is 24 miles, and course N. by W. ½ W., with a shore-line broken by several small streams, amongst which are the *Nechesne* (reconnaissance, 1853,) in latitude 45° 02′, with rocks in the entrance; the *Nestuggah* (reconnaissance, 1853,) in latitude 45° 06′, called Yaquinna in reconnaissance of 1850, and having a large rock off its mouth; the *Nawuggah* (reconnaissance, 1853,) in latitude 45° 14′, and on the south side of whose entrance is a single rocky islet, hereafter referred to.

De Mofras has C. Lucuat in this latitude, and a small stream, R. Kaouai, south of it.

CAPE LOOKOUT.

The soundings from Foulweather to this cape show from 13 to 31 fathoms of water at a distance of a mile from the shore, increasing from 18 fathoms north of latitude 45° N.

This cape is situated in latitude 45° 20′, longitude 124° 00′. It projects somewhat sharply into the sea for half a mile, and as seen from the south the top is tolerably flat and regular, and at the highest part we judge it to attain an elevation of 3,000 feet. The face directly toward the ocean is perpendicular, high, and toward the south destitute of trees. About eight miles southward of it is a large single rock off the Nawuggah, estimated to be 250 feet high, and standing well out from the low sand beach behind it. No rocks lie off this cape, but one appears very close inshore, about a mile to the northward of it.

This name is that used on the Coast Survey charts of 1850 and 1853, and is intended to apply to the cape mentioned and fully described in July, 1778, by Meares, whose description has been corroborated by Vancouver, and incidentally by ourselves.

For January, 1859, the line of equal magnetic variation of 20° east crosses the coast-line in latitude 45° 23′, and in latitude 45° 13′ crosses the 125° of longitude. This line annually moves about one mile southward.

CAPE MEARES.

Two or three miles after leaving Cape Lookout the land falls to a low sand beach, behind which is a long lagoon, called the Nat-a-hats, stretching northward, and having an opening under the south head of the well-marked point to the northward, which is the termination of a spur or ridge running from the southeastward, presenting an abrupt front to the ocean for about two miles, and being part of the western boundary of Tillamook bay. In coming down this coast in the fall of 1857, we made a few notes upon some objects, and find the following memorandum made whilst near this point: "Three high rocks (one arch) off point south of False Tillamook; one more on the north side." Not being then aware of any doubt as to the name of the cape, no other particulars were noted. Four rocks are laid down off the southwest face on the Coast Survey reconnaissance of 1850, and one on the north. Three large rocks and one small one are laid down off the

southwest face in the original sheets of the reconnaissance of 1853, the most distant being one mile from shore, with several small ones between them and the shore, and two or three others off the northwest face.

In 1775 Heceta placed La Mesa, the Table, in latitude 45° 28′—a flat-topped mountain, seen at a great distance.

In July, 1788, Meares, in the Felice, after passing False Tillamook, says: "The distant southerly headland we called Cape Lookout. This cape is very high and bluff, and terminates abruptly in the sea. At about the distance of two miles from it there rose three large rocks, which are very remarkable for the great resemblance they bear each other. The middle one has an archway, perforated, as it were, in its centre, through which we plainly discovered the distant sea. They more particularly attracted our notice as we had not observed between King George's sound and this place any rocks so conspicuously situated near the land; their distance from each other might be one-quarter of a mile, and we gave them the name of the 'Three Brothers.' By eight in the evening we were within three or four leagues of Cape Lookout, which we judged to lie in latitude 45° 30′ north, longitude 235° 50′ east."

In 1792 Vancouver described it as a small projecting point, yet remarkable for the four rocks which lie off it, one of which is perforated as described by Meares. He places it in latitude 45° 32′.

This cape is very frequently, but erroneously, stated to be the "Clarke's Point of View," as described by Clarke in the winter of 1805–'6.—(See remarks upon Tillamook Head.)

In the Coast Survey reconnaissance of 1853 the northern part of this cape is placed in latitude 45° 30′, longitude 123° 58′, and stretching southward two miles to the cluster of rocks above described.

We applied the name to this cape in 1857.

TILLAMOOK BAY.

On the Coast Survey reconnaissance of 1853 the entrance to this bay is placed in latitude 45° 34′, four miles north of Cape Meares. The southern point is low, and the termination of a spur from the crest of the cape, whilst the north head is high and bluff. The entrance is very narrow, and reported to have very little water upon the bar; inside it expands into a long wide bay, stretching to the S.SE. behind Cape Meares. No survey has yet been made of it, and some doubts are expressed about the enlarging of the river to form a bay. Two miles northward of the northern head stands a couple of large rocks; thence the coast runs nearly straight to False Tillamook, receiving a considerable stream, called the *Nehalem*, in latitude 45° 41′. Clarke, when about five miles south of Tillamook Head, says that "the principal town of the Killamucks is situated 20 miles lower (south) at the entrance to a creek called Nielee, expanding into a bay, which he named Killamucks bay. Upon this bay were several Killamuck towns. Killamuck river is at the head of the bay, 100 yards wide, and very rapid; but having no perpendicular fall, is a great avenue for trade There are two small villages of Killamucks settled above its mouth, and the whole trading portion of the tribe ascend it till by a short portage they carry their canoes to the Columbia valley, and descend the Multnomah to Wappatoo island." This information he obtained from Indians and traders. On this short expedition he made all his distances from Cape Disappointment and Point Adams too great, and reducing the forementioned 20 miles by the proper proportion, it would give us 13 miles as about the position of the Nehalem. His name seems to agree with this, but the description applies to what is generally known as Tillamook bay.

The shore about the Nehalem is low and sandy, with sand dunes backed by high wooded hills, and cut up by many valleys. It was here that Meares stood in for an anchorage, (July, 1788,) until he found bottom in 10 fathoms, but hauled out again and named the place Quicksand bay, and the adjoining headland north, Cape Grenville.

CAPE FALCON, OR FALSE TILLAMOOK.

The northern part of this headland lies in latitude 45° 47′, longitude 127° 58′. Upon passing close by it in 1857, we judged it to be not less than 3,000 feet high, with the sea-face coming precipitously to the ocean, and off it lie two prominent rocky islets. As seen from the southward the top is irregular whilst the hills inshore fall away. Like some other points in this latitude, the southern face of the cape is destitute of trees, but covered with a thick growth of grass, bushes, and fern. Two miles south of it is a stretch of sand beach and sand dunes.

From Cape Lookout to this headland a depth of 20 fathoms may generally be found a mile from shore; but, as upon the whole coast, a heavy regular swell always rolls in from the west.

In 1775 Heceta placed a headland in latitude 45° 43′, to which he gave the appellation Cape Falcon. According to his description it had a rocky islet lying off it. This name would be far better than applying the term "false" to capes, bays, &c., the names of which were at first uncertain.

In 1788 Meares called this cape Grenville.

The Indian name for the head is Ne-a-kah-nie.

TILLAMOOK HEAD.

This prominent cape, in latitude 45° 58′, is 12 miles N.NW. from Cape Falcon, and 19 miles SE. by S. ½ S. from Cape Disappointment. The coast from Cape Falcon curves two miles eastward; is bold and rugged, guarded by many high rocky islets and reefs, and in several places bordered by a low sand beach at the base of the cliffs. Two miles south of the head, Clarke (1805–'6) locates a creek 80 yards wide at its mouth, which he calls Ecola, or Whale creek. From the south bar of the Columbia river the summit of Tillamook appears flat for some distance back, and has an estimated height of 2,500 feet. Off the face of the cape, which is very steep, lie several rocky islets; one of them is high and rugged, and stands out about a mile from the southwest face. Around it the water is believed to be deep, as we have seen a steamer come almost upon it in a thick fog; but inside of it lie several high rocks. From the bar two rocks can be distinctly seen, the inner being the larger, and its apparent distance from the head about half the apparent height of the cape. Whether the smaller is the one off Cape Falcon, we did not determine. As seen from the southward the large rock has a perpendicular face to the westward, and slopes to the east. It is the resort of thousands of seals.

This cape is a good landmark for making the mouth of the Columbia river, no such high headland occurring on the coast northward of it for over 70 miles, and before being up with it the moderately high land of Cape Disappointment is seen and made as two islands.

The face of the cape is much broken, and formed principally of yellow clay, presenting a bright appearance in the sunlight. Clarke says that 1,200 feet above the ocean occurs a stratum of white earth, then (1805–'6) used by the Indians as paint; and that the hill-sides slip away in masses of 50 to 100 acres at a time.

Upon the top of the cape Clarke says he found good, sound, solid trees growing to a height of 210 feet, and acquiring a diameter from 8 to 12 feet.

From Tillamook head southward many miles was the country of the Killamuck Indians, then estimated to number 1,000 people, and having 50 houses.

In latitude 45° 55′ La Perouse speaks of a cape, formed by a round-topped mountain, as the Cape Redondo of the Spaniards. It bore E. 5° S. from his position.

De Mofras calls it the Cap N. S. de la Lux.

This is the head which is properly called "Clarke's Point of View."

Some recent maps call this Cape Lookout.

The coast from Point Orford to Tillamook Head is well diversified by high hills and valleys, presenting a country well watered by numerous small streams emptying into the ocean. It is densely covered with various woods, and for a few miles inland looks favorably from the deck of a vessel. Some distance in the interior ranges of mountains occur, the general direction of which appears to be parallel with the coast-line, which attained its greatest elevation and compactness between Cape Falcon and Tillamook Head, after which a sudden and marked change takes place, and a stretch of low sandy coast commences and runs for nearly 100 miles northward, only broken by Cape Disappointment.

COLUMBIA RIVER.

POINT ADAMS.

Two miles northward of Tillamook Head commences a peculiar line of low sandy ridges, running parallel to the beach towards Point Adams, and appearing like huge sand waves covered with grass and fern. Between some of them run small creeks, whilst the country behind is low, swampy, and covered with wood and an almost impenetrable undergrowth. About three miles north of the head Clarke says a beautiful stream empties with a strong rapid current. It is 85 yards wide, and has three feet at its shallowest crossing.

Point Adams is low and sandy, covered with bushes and trees to the line of sand beach and low dunes; and although it is reported to have washed away over half a mile since 1841, we find comparatively small changes since the survey of Broughton in 1792.

The geographical position of the triangulation station of the Coast Survey on the point is:

	°	′	″	
Latitude	46	12	30.4	north.
Longitude	123	56	55.8	west.
	h.	*m.*	*s.*	
Or, in time	8	15	47.7.	

This station is on the inside of the point, and almost half a mile from it.

No light-house exists here, but the necessity for one has been so repeatedly urged that we cannot refrain from calling attention to a few facts bearing upon the question. Off this point, SW. by S. 3¼ miles, lies (1852) the bar of the south channel, through which the far greater portion of the trade has passed; and all vessels use this point as a standard point for their ranges. During the early part of the evening dense fogs, formed over the waters of Gray's and Shoalwater bays, are brought southward by the summer winds, and roll over Disappointment, which they completely shut in before reaching across the river, so that a vessel might make a light on Point Adams when the other cape was invisible; but by seeing both lights a vessel could hold any required position at night near either bar, and run in and take a pilot upon the first opportunity; for it would be assuming too great a risk to enter the river at night, or without a pilot.

This point was called Cape Frondoso by Heceta, who discovered, but did not enter this river in August, 1775; and named Adams' Point by Captain Gray, in 1792. The Indian name of the point is Klaát-sop. It is now called Point Adams.

The beach around Point Adams and to the southward some distance is usually called Clatsop beach. Upon it, many years ago, before the whites occupied the country, a Chinese or Japanese junk, with many hands and a cargo of beeswax, was cast ashore and went to pieces; but the crew were saved. In support of this Indian tradition, there are occasionally, after great storms, pieces of this wax thrown ashore, coated with sand and bleached nearly white. Formerly a great deal was found, but now it is rarely met with. Belcher mentions having a specimen. Many people on the Columbia possess them, and we have seen several pieces. In a late work* this wreck has been confounded with another that took place near Cape Flattery.

COAST AND SHORES OF WASHINGTON TERRITORY AND OPPOSITE SHORE OF VANCOUVER ISLAND.

CAPE DISAPPOINTMENT.

The north side of the Columbia river forms part of Washington Territory; it was the southern boundary of the "New Georgia" of Vancouver, 1792.

This cape is the only headland from Tillamook to latitude 47° 20′ that breaks the low line of shore. It presents a geological formation not before met with on the seaboard, being composed of horizontal columnar basalt, rising to an elevation of 287 feet, disposed in a succession of huge round hills, broken on the sea front by short strips of sand beach, and covering an irregular area of about three miles by one. The sea-faces of all the hills and irregularly projecting knobs rise perpendicularly for many feet, then slope slightly inshore to narrow ridges; are destitute of trees, but covered with grass, fern, and bushes, and have an excellent though thin soil. Inland of their crests the trees commence, and their tops reaching above the summits of the hills increase their apparent height. The inshore slope of the hills is more gentle, so that paths can be easily carried to their tops. In 1851 we opened an ox-team road to the summit of the cape. When the evening fogs from the northern bays do not cover the cape, we have sometimes experienced a dense fog rolling down the river about sunrise, enveloping everything below the top of the cape upon which we have stood, when it looked like an island less than a hundred yards in extent, and surrounded by the river fog, that must be felt to be appreciated. The evening fogs are so regular that we were 35 days on this cape before obtaining a single night's observations.

As seen from the southward, when off Tillamook Head, Cape Disappointment is made as two round-topped islands; approached from the northwest it rises in a similar manner; from the west and southwest it appears

* Perry's Japan.

projected upon the mountains inland, but the slightest haziness in the atmosphere brings it out in sharp relief. This cape being basaltic, and showing an almost iron front to the river and sea, it is impossible that, "in the memory of many, Cape Disappointment has been worn away some hundred feet by the sea and strong currents that run by it."

On the first landing beach on the inside of the cape we found a deposit of auriferous and ferruginous "black sand," the flakes of gold being very small and scarce. This ferruginous deposit—the "black sand" of the California gold digger—caused a local disturbance in the magnetic variation, amounting to 26′.2, being that quantity less than the declination found upon the summit of the cape. Here we also found the remains of the ovens used by the shipwrecked crew of the United States sloop-of-war Peacock, lost on the north shoals of the north channel in 1841.

CAPE DISAPPOINTMENT LIGHT-HOUSE.

The light-house is not upon the top of the cape, but upon a spur a little to the west of the southeast point, and about 95 feet below the highest part. The tower is whitewashed, placed 192 feet above the level of the sea, and being 40 feet in height and projected against a dark green background, shows well in daylight.

The light is a *fixed white light*, of the first order of Fresnel; was first exhibited October 15, 1856, and shows from sunset to sunrise. Under a favorable state of the atmosphere it should be seen—

From a height of	10 feet	at a distance of	21	miles.
	20	" "	$22\frac{1}{2}$	"
	30	" "	$23\frac{3}{4}$	"
	60	" "	$26\frac{1}{3}$	"

Its geographical position, as determined by the Coast Survey, is:

	° ′ ″	
Latitude	46 16 32.7	north.
Longitude	124 02 13	west.
	h. m. s.	
Or, in time	8 16 08.9	

Magnetic variation, 20° 45′ east, in July, 1851, with a yearly increase of 1′.

Counting round seaward from the south, it commands the horizon for about 135 degrees; that is, from S.SE. to W.NW.; so that vessels coming from the northward cannot see the light until nearly in the latitude of the river. Placed on the top of the cape, it could have been easily made to show over the northwest part of it, and would also have commanded the entire river and Baker's bay.

From Cape Disappointment we have the following bearings and distances of objects to the northward:

Point Grenville	NW. by N. $\frac{1}{2}$ N.,	62	miles.
Destruction island	NW. by N.,	84	"
Flattery rocks	NW. $\frac{5}{6}$ N.,	118	"

The last line passes tangent to the coast in latitude 47° 58′, where there are two well-marked rocks, which will be hereafter described.

FOG-BELL AT CAPE DISAPPONTMENT.

A fog-bell of 1,600 pounds has been placed on the bluff in advance of the light-tower, and will be sounded during foggy or other thick weather, night and day. The distinctive mode of striking we have not yet found published. The machinery is on a level with the ground, in a frame building, whitewashed, and with the front open to receive the bell.

The primary astronomical station of the Coast Survey is on the highest part of the southern extremity of the cape. Its geographical position is:

	° ′ ″	
Latitude	46 16 35.2	north.
Longitude	124 02 00.8	west.
	h m. s.	
Or, in time	8 16 08.1.	

From Cape Blanco to Cape Disappointment the extent of ocean shore-line is not less than 285 miles.

In August, 1775, this cape was placed by Heceta in latitude 46° 17′, and called Cape San Roque.

In July, 1788, it was called Cape Disappointment by Meares, and placed in latitude 46° 10′ "by an indifferent observation." It was called Cape Hancock by Gray, in 1792, and the entrance placed in latitude 46° 17′; he, however, changed this name to Disappointment, upon hearing that Meares had so named it.

In 1792 it was placed in latitude 46° 19′ by Vancouver.

On the Pacific coast it is and has been known by no other name than Cape Disappointment.

The Indian name for the cape is Káh-eese.

THE ENTRANCE TO THE COLUMBIA RIVER.

The entrance to this, the great river of the Pacific coast, is five miles wide between the nearest parts of Cape Disappointment and Point Adams, bearing S. 58½° E., and N. 58½° W. from each other; but the passage is badly obstructed by shifting shoals that lie two or three miles outside of the line joining the points. The numerous surveys that have been made of this river prove so conclusively the great changes which the channels through the shoals undergo, that we shall not attempt to give any directions concerning the present north and south channels. The best advice we can offer is, when up with the bar, *wait for a pilot.* The mail and coasting steamers enter the south channel, (October, 1857,) parallel and close to the beach south of Point Adams; but, with a heavy swell from the westward, they roll very much after rounding the point. In heavy weather some of them prefer entering the north channel, although it gives a detour of some miles, but that bar has, and always has had, more water upon it than that at the south channel, and does not change its position as much, from the unwearing nature of the cape. Sailing vessels cannot beat into the south channel against the summer winds blowing from the northwest, but almost invariably come out through it. The heavily laden vessels of the Hudson Bay Company have always used the north channel.

During heavy weather, and especially in winter, the sea breaks with terrific fury from northwest of Cape Disappointment well to the southward of Point Adams; and we remember the mail steamer trying for 60 hours to find the smallest show of an opening to get in. Sailing vessels have laid off the entrance six weeks, waiting for a fair opportunity to enter, and many lie inside for weeks trying to get out. The mail steamer, meanwhile, exerting all her power, would drive through the combers, having her deck swept fore and aft by every sea. Few places present a scene of more wildness than this bar during a southeast gale, contrasting strongly with many times during the summer, when not a breaker is seen to mark the outline of the shoalest spot. From the summit of Cape Disappointment we have often watched the bar in varied states of wind and weather, and crossed it when calm and breaking. What is most needed here is a powerful propeller tug, which the amount of trade would assuredly warrant, when we know that the much smaller trade of Humboldt bay supports handsomely a tug for that bar. In bad weather the pilot-boats cannot venture out, but a steamer might; and the mail steamers, to avoid delay, now regularly carry a bar pilot with them.

During the season of freshets, about June, the pilots say that the river brings down such a vast body of water that they can frequently take up for use fresh water upon the bar.

When off the entrance in fine, clear weather, the beautiful snow peak of Mount St. Helens* shows over the lowest part of the land inside, and apparently in the middle of the river valley. It is very regular in outline, and presents a pyramidal appearance, having a base equal to either side. It is over 75 miles eastward from the entrance to the river, and attains an estimated elevation of 13,500 feet. It is volcanic, and occasionally discharges volumes of smoke.

On the 23d of November, 1842, during an eruption, the ashes from it fell over the Dalles of the Columbia like a light fall of snow. On the 13th of November, 1843, St. Helens and Rainier were both in action. Humboldt erroneously states that this volcano is always smoking from the summit crater.—(See remarks on page .)

On October 22, 1792, Vancouver reported having seen several water-spouts off the entrance to the river, and that some of them passed quite near his ships.

The current.—In October, 1851, whilst lying at anchor in the south channel off Sandy island, we measured the strength of the ebb current, and found it to be nearly 5½ miles per hour.

Tides.—At Astoria the corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is XII*h.* XLII*m.* The mean rise and fall of tides is 6.1 feet, of spring tides, 7.4 feet, and of neap tides, 4.6 feet. The mean duration of the flood is 6*h.* 03*m.*, of the ebb, 6*h.* 28*m.*, and of the stand, 0*h.* 33*m.* The average difference between the corrected establishments of the a. m. and p. m. tides of the same day is 1*h.* 02*m.* for high water, and 0*h.* 52*m.* for low water. The differences when the moon's declination is greatest are 1*h.* 38*m.* and 1*h.* 15*m.*, respectively. The average difference in height of those

* Named by Vancouver in 1792.

two tides is 1.4 foot for the high waters, and 2.3 feet for the low waters. When the moon's declination is greatest those differences are 1.9 foot and 3.7 feet, respectively. The average difference of the higher high and lower low waters of the same day is 7.9 feet, and when the moon's declination is greatest, 8.9 feet. The higher high tide in the twenty-four hours occurs about 12*h*. 11*m*. after the moon's upper transit, (southing,) when the moon's declination is north, and about 0*h*. 15*m*. before, when south. The lower of the low waters occurs, about 7½ hours after the higher high water. The greatest observed difference between the two low waters of one day was 5.1 feet, and the greatest difference between the higher high and lower low waters of one day was 11.5 feet.

For the method of computing the times and heights of high and low waters for any date, see the example of San Francisco on pages 311–315, and use the tables given for Astoria at the end of the directory.

The tide makes 40 minutes earlier at Cape Disappointment than at Astoria.

THE DISCOVERY OF THE RIVER AND THE CHANGES IN THE CHANNEL.

The discoverer of this river was Bruno Heceta, commanding the Spanish ship Santiago. On the 15th of August, 1775, he was off the entrance of a great river or inlet, which he called Enseñada de Asuncion, (Assumption inlet;) but in the charts afterwards published in Mexico it was denominated Enseñada de Heceta, and the Rio de San Roque.

In July, 1788, Meares sought an anchorage under Cape San Roque, and finding the breakers barring his progress, applied the name Deception bay to the mouth of the river; and doubtless to vent his pique upon the Spaniards for the ill treatment he had received at their hands, wrote: "We can now safely assert that there is no such stream as that of Saint Roc existing, as laid down in the Spanish charts; to those of Maurello we made continual references, but without receiving any information or assistance from them."

In April, 1792, Vancouver sought for this river, but finding a great line of breakers before him, very wisely did not attempt to pass through them. On the 29th of that month he spoke the Columbia, of Boston, commanded by Captain Gray, who informed him that he had laid off the mouth of a river in latitude 46° 10′, where the outset or reflux was so strong that for nine days he was prevented from entering; whereas Vancouver, having passed this position on the 27th, wrote on that day "that if any inlet or river should be found, it must be a very intricate one, and inaccessible to vessels of our burden, owing to the reefs and broken water."

On the 11th of May, 1792, about noon, Captain Gray's log states, that "being a little to the windward of the entrance into the harbor, bore away and run in E.NE. between the breakers, having from 5 to 7 fathoms water. When we came over the bar we found this to be a large river of fresh water, up which we steered." Without knowing of any reliable chart by him, we are of opinion that then there was but one channel, and that over the position now occupied by Sandy island. He evidently came upon the entrance after very favorable weather, because he not only passed over the bar between the breakers with all sail set, but had only made 6 leagues between daylight and noon. He remained eight or nine days in the river, made a rough sketch as far as Tongue Point or Gray's bay, and named the river after his ship, calling it the "Columbia's river."

In October 1792, Vancouver tried to enter the river with the Discovery, but failing on account of the bad state of the bar, he ordered Lieut. Broughton, in the armed tender Chatham, to enter, which he did three days afterwards, and then commenced a survey of the river, carrying it forward in boats to Point Vancouver, in latitude 45° 27′, and returning to his vessel in ten days. He considered the widest part of the river for 25 miles as an inlet. This is the first reliable survey we have of the river. Gray's eye sketch, which extended to about Gray's bay, showed 36 miles from Cape Disappointment, whereas it is only 16, following the course of the northern channel by the most recent surveys. After crossing the bar the Chatham anchored in 4 fathoms, 1¼ mile E. by S. ¾ S. from the eastern part of Cape Disappointment. Within a cable's length of the ship the sea broke very heavily on the western end of a shoal called the Spit Bank, the southern edge of which stretched about E. by N. in a direct line to *Chinook Point*,* behind which rises *Scarborough hill*,†

* Its present name, but called Village Point by Broughton, because he here found a large deserted village. He says the natives called it Chenoke.

† Named after an employé of the Hudson Bay Company, who lived here and acted as pilot on the river at and since the time of the United States Exploring Expedition. The Indian name is No-se-misp.

destitute of trees and covered with fern. Well up in *Baker's bay*,* north of the cape, he gives soundings in 3, 5, and 7 fathoms within less than a mile from the shore. From Cape Disappointment the southern edge of an outside shoal extended about 1½ mile SW. by S., stretched W.SW. nearly 2 miles, then trended N.NW. parallel to the outer beach. A great shoal occupied the whole middle part of the river east of Point Adams. Its northern edge ran parallel with and half a mile from the shore between Gray's Point and Ellis' Point,† there being from 7 to 14 fathoms in the channel between it and the shore. From Ellis' Point it then stretched in nearly a straight line to within a mile of Point Adams, where the tail of it had but 2 fathoms; thence curved to the SE. about a mile, and stretched in a long curve to *Tongue Point*,‡ keeping about three-quarters of a mile from the shore abreast of Point George, 5 miles from Point Adams; and in the channel between it and the shore he gives from 3 to 7 fathoms. Starting half a mile inside of Point Adams, and stretching over to the tail of the above shoal, was a bar having but 3 fathoms upon it.

From Point Adams the northern edge of the breakers stretched seaward, first, W. ½ N. about 3¾ miles; next, SW. by W. ½ W. about 5 miles; then took a rounding course to the southward, extending along the coast at a distance of nearly 8 miles. From this point of view (Adams) the north and south breakers were so shut in with each other as to present an entire line of heavy broken water across the channel, which was about 1½ mile wide at the narrowest part, and having not less in any place than 4 fathoms. The outer line of 5 fathoms off the bar bore SW. by W. 5¼ miles from Cape Disappointment.

This channel permitted the heavy western swell to roll in over the bar, and break upon the shoal stretching between Point Adams and Point Ellis. The directions given by Broughton for entering are, to bring Tongue Point, which looks like an island near the southern shore of the river, to bear about E. by N. and then steer for it, crossing the bar in 4 and 5 fathoms.

In stating the distances above, we should mention that Broughton gives the course from Disappointment to Adams as SE. by E. and the distance about 4 miles, whereas it is really 5 miles. Making this change in his base, and all other positions in proportion, we find that Tongue Point comes within half a mile of the determination by the triangulation of the coast survey, proving Broughton's work right, but the base wrong.

From the foregoing description we deduce the following facts: That but one channel existed at the entrance to the Columbia river in 1792; its general direction across the bar was E. by N. ¾ N., passing 1½ mile south of Cape Disappointment; it was 6 miles long from the outer five-fathom line to a line joining Point Adams and the cape; it was 1½ mile wide, and had not less than 4 fathoms in it; that the Spit Bank stretched nearly straight from about a mile east of the cape to Chinook Point. In the space bounded by the three lines joining Cape Disappointment, Chinook Point, and Point Adams, 5 fathoms water was the least found. The deepest channel after getting in was close under the north side of the river eastward of Chinook Point, and that, between the river side of Point Adams and the shoal stretching from Gray's Point towards it, a narrow channel existed with 3 fathoms in it.

Broughton says: "The discovery of this river, we were given to understand, is claimed by the Spaniards, who call it Entrado de Ceta, after the commander of the vessel, who is said to be its first discoverer, but who never entered it; he places it in 46°."

After completing the survey he could not get out for several days, and the Jenny had been unable to cross the bar during the entire time he was up the river.

In 1813, when the English sloop-of-war Raccoon arrived in the Columbia she found the shoals off the entrance had considerably changed in extent and position from the time of Broughton.

British Admiralty Survey in 1839.—In 1839 the entrance was surveyed by Sir Edward Belcher, in the Sulphur, and remarkable changes had taken place. Between Cape Disappointment and Point Adams a large middle bank had formed, and near its eastern extremity a sandy island, with a bank 1½ mile in extent, visible at low water and full of snags and trees. Its northwestern point bore E.SE. 2¾ miles from Cape Disappointment, stretching on this course 1½ mile further, so that its eastern extremity, off which was deep water, bore N. ½ W., 1⅓ mile from Point Adams. This island and the bank naturally divided the waters of the river, the greater volume running to the northward of the bank, through *Belcher's* channel, with 7 fathoms

* Named by Broughton after Mr. James Baker, commanding the schooner Jenny, of Bristol, which he found at anchor here upon entering.

† So named on Belcher's survey of 1839; subsequent surveys call it Point Ellice.

‡ So named by Broughton.

in it, and being a mile wide within the limits of the 3-fathom lines until it aproached the cape, where it was contracted to less than half a mile on a line E.SE. from the cape, but having increased its depth to 16 fathoms. This channel had cut away the western end of Spit Bank, as laid down by Broughton. From the cape, which it washed, this channel ran south for 2¼ miles, with an average depth of seven fathoms, and being a mile wide within the three-fathom lines; then it ran SW. ½ W. for 2¼ miles to the bar, expanding in width and decreasing in depth, but in no place giving less than 4½ fathoms upon the bar, which bore S.SW. from the cape, distant 4 miles, and from Point Adams W. ¾ S., distant 6 miles. In the northern angle, where the channel made the east turn, he has laid down a spot bare at low water, with seven fathoms close under it. From the cape it bears S. by W. 2¼ miles.

The main channel eastward of Sandy island was under Chinook and Ellis Points, having deep water off them, but becoming shoaler and intricate beyond them.

Between this channel and the south shores lay the great shoal existing in 1792, not very much changed in features, with a narrow channel running from Point Adams to Tongue Point, having from 4½ to 9 fathoms.

The west end of this shoal stretched out to the line joining Chinook Point with Point Adams, about a mile from the latter, whilst between the tail of Sandy island and this shoal was a channel half a mile wide, and having from 3½ to 4½ fathoms. Between Sandy island and Point Adams ran Queen's channel*, contracting to half a mile wide within the three-fathom lines, one mile from Point Adams, gradually expanding and running in a general direction W. by S. for 3¼ miles, when it divided into two—one running into the north channel through a narrow four-fathom cut, and the other continuing south, forming a *south channel* one-third of a mile wide, and having 3¼ and 3½ fathoms upon it. From Cape Disappointment it bore S. ½ E., distant four miles, and from Point Adams W. by S. ½ S., four miles. Between the two bars, about two miles apart, lay an irregular shoal of small extent, having 2½ fathoms upon it. The joining of the North and Queen's channels enabled a vessel to have a four-fathom channel south of Sandy island, with a leading wind in summer time, while the north was a beating channel.

A spot, bare at low water, existed 1¼ mile from Point Adams, its northern extremity close to Queen's channel, and bearing west from Point Adams. It stretched south half a mile, and was nearly a quarter of a mile in width.

It may not be out of place here to note that the channel on the south side of the river, east of Tongue Point, now known as the *Woody Island channel*, and claimed as a recent discovery, is clearly indicated by the soundings of Belcher.

By a comparison with the partial survey of 1792 very remarkable changes will be seen to have taken place. The first is the formation of the great *Middle Bank**, covering an extent of four square miles within the three-fathom lines, and part formed into an island occupying the track which Broughton, and doubtless Gray and Baker, sailed over with five fathoms; the formation of two channels; the bank on the SW. face of Cape Disappointment stretching 1½ mile southward of its old limit, and almost crossing the only channel of 1792; the existence of the Middle Bank, within half a mile of the cape, and having but one fathom upon its northwest point, where the Sulphur grounded, when Broughton states that he anchored 1¼ mile E. by S. ¾ S. from the inner part of the cape, there being deep water between him and the cape, whilst the Spit Bank, which was within a cable's length of his anchorage, and stretching to Chinook Point, had been cut away by the broad Belcher channel; the cutting away of three miles of the western part of the shoal off Point Adams, and the opening of the channel along the Clatsop beach and south shore, past Point St. George and Tongue Point.

Belcher calls the bank S.SW. of the cape the Spit Bank; and where Broughton's Spit Bank joins Chinook Point, he designates it Chehalis Spit.

In his narrative he remarks "that the shoals in the entrance to this river have most materially changed their features within the last two years."—(Vol. 1, p. 288.)

Survey of the United States Exploring Expedition, 1841.—In this survey we find but one opening to the ocean, with the inside north and south channels combining and passing through it. The soundings are not numerous enough upon and outside the bar to enable its proper form, extent, and depth of water being traced. Not less, however, than four fathoms are shown upon it, and as much as 4½ fathoms are found on one particular line crossing it. Within the five-fathom curve the bar was two-thirds of a mile across, and stretched seaward in the form of a horseshoe from the north to the south breakers.

* Named by Belcher in 1839.

From Cape Disappointment the shoalest part of the bar bore SW. by S. ½ S., distant four miles; from the norhernmost trees on Point Adams it bore W. by S., distant 6½ miles; this line passing tangent to the north end of the south breaker. Towards the contracted channel inside the bar the north shoal stretches S. ½ W., 2½ miles from the cape, and the great south shoal stretches nearly W.SW., five miles from Point Adams. At a distance of two miles inside the bar these shoals contracted the channel to a width of one mile, and increased the depth to nine fathoms.

From the bar the course in for the north channel was E.NE. for 2¾ miles, when Cape Disappointment bore N. by W.; then N. ½ W., 3¼ miles, to the inside of the cape, off which the channel was less than half a mile wide, with five fathoms close under the bluff, and 17 fathoms in the deepest part. After passing the cape one-third of a mile the channel was wide, regular, and deep for four miles, running nearly E. by S. ½ S. towards Young's Point, and passing between the bare parts of the middle bank forming Sandy island, and the Chinook shoal. At the eastern end of Sandy island the north and south channels came together for three-quarters of a mile, with a depth of 4¼ fathoms, and the middle bearing north 1¼ mile from Point Adams. The great middle shoal then separated them, and the north channel ran close under the shores at Chinook Point and Point Ellis, contracting and shoaling to three fathoms where the Tongue Point channel entered

From the bar the course for the south channel was E. by N. ½ N. for 6¼ miles, running within three-quarters of a mile of Point Adams with five fathoms; thence along the Clatsop beach E. by S., 3½ miles in a good channel, half a mile wide, and having from six to eight fathoms of water; and finally NE. by E. 2½ miles, passing Young's Point, and running close under the southern shore near Astoria.

The middle bank* was nearly triangular, with one point abreast of Cape Disappointment; the second, 1⅓ mile N. by W. from Point Adams, and four miles E. by S. ⅓ S. from the cape; and the third at the confluence of the channels inside the bar, and 2½ miles SE. by S. ½ S. from the cape. Each side was, therefore, about three miles in length. Sandy island was then composed of two parts; the eastern end of the larger and southern one bearing N.NW. 1¼ mile from Point Adams.

The western tail of the great middle shoal,† lying eastward of Point Adams, bore from that point about N.NE., a little over a mile distant, and in range to Chinook Point; from Cape Disappointment it bore E. by S. ¼ S., distant 4¾ miles.

The map of the survey of the United States Exploring Expedition shows the distance from Cape Disappointment to Point Adams as being only 4½ miles, with the bearing SE. by E. ⅓ E. The distance should be almost five miles, according to the triangulation by the U. S. Coast Survey.

The channel on the south side of the river and east of Tongue Point, mentioned as being clearly indicated by the admiralty survey of 1839, was developed by the U. S. Exploring Expedition in 1841. It was named the Boston channel, and strikes the north shore channel 7½ miles above Tongue Point, and about one mile above the Pillar rock.

The changes that had taken place since Belcher's survey, two years previous, were: that the south sands had stretched westward over the entrance of Queen's or the south channel; and that channel had joined with the north and emptied over one bar, which was almost identical in position and extent with the survey of 1839.

The north channel was, therefore, little changed; it had several lumps with only four fathoms upon them; its general direction was the same; it had at least a fathom more than the south channel, and retained the same shape and direction after passing inside the cape.

The contour and position of the middle bank was nearly the same, but its eastern point had moved nearly half a mile to the NW., giving deep water where Belcher placed the eastern part of Sandy island, whilst the western islet occupied nearly the same position as formerly.

The western extremity of the great middle shoal, east of Point Adams, was hardly changed.

The course in over the bar, and through Queen's or the south channel, was straight for over six miles to abreast of Point Adams, and then ran in the same direction as in 1839.

The United States sloop-of-war Peacock was lost on the north shoals, 1½ mile S. by W. from Cape Disappointment.

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* Called Middle sand bank by the U. S. Exp. Exp., 1841.

† Called the Upper sand bank by the U. S. Exp. Exp., 1841.

SURVEY OF 1850.

This, the first examination by the Coast Survey, was undertaken under peculiar difficulties which were successfully overcome.

In this survey we find the formation of a new south entrance, but evidently of so recent date that the bar at the entrance cannot be said to have over 16 feet upon it, although two very narrow passages on either side of the middle ground of the bar give three fathoms. From Point Adams this bar bore SW., distant 3¾ miles, being S.SE. 5¼ miles from Cape Disappointment light-house. Inside the entrance, within the three-fathom curve, the width of the channel was half a mile, increasing to over a mile, and the depth of water regularly increasing to 14 fathoms off Clatsop spit, 1½ mile from Point Adams, on a line to Cape Disappointment. The direction of the channel was straight, N. by E. ½ E. to Sandy island, rounding Clatsop spit, and running close to and parallel with the beach east of Point Adams, with a depth of from four to eight fathoms. From the outside of the bar the south edge of the south shoal stretched toward the shore, the bottom changing from hard sand to soft mud in approaching the beach.

The extent of the north bar had so much increased that it is difficult to describe, for it had an area of over two square miles, with from 4 to 5½ fathoms upon it, and the bottom varying from hard sand to soft mud. The middle of it lay south 3¾ miles from the highest part of the cape. Within the three-fathom line the entrance was 1½ mile wide, and in ordinary weather was marked by a line of breakers on either side. The course was nearly straight to the inner point of the cape, with the depth of water increasing to 11 fathoms abreast of it, where the channel was a little over a third of a mile wide, with the Sulphur spit on the east side. Passing the cape, and turning eastward and then E.SE., the three-fathom channel was crooked, and in one place only 400 yards wide.

The north and south bars bore from each other SE. and NW., distant 3½ miles apart, with the seaward face of the middle bank making a direct line on that course. This bank had changed its contour, and was very irregular.

W.SW. of Sulphur spit a three-fathom channel had nearly cut through the north sands. Should a channel open here it would doubtless remain a reliable one. From Cape Disappointment it bore SW. ½ W., 1½ mile distant.

Sandy island bore E. by S. ¾ S., three miles from the cape, and NW. ¼ N., two miles from Point Adams.

The western tail of the great middle bank bore NE. by N. ½ N., a mile from Point Adams.

At the time of this survey the channels were buoyed out, but subsequent gales displaced the buoys.

We note the following changes since the survey of 1850, a little over two years:

That the new south channel had been developed, and the bar moved three-quarters of a mile eastward, with half a fathom more water and the entrance wider.

That the north channel had contracted to half its width at the bar, with its northern line upon the line of 1850; the depth of water not quite so great, but still having a fathom more than the south bar, the channel not as straight, and the formation of a swash channel SW. of the cape across the north sands.

That the Spit bank of 1792 was being redeveloped.

That the middle bank had increased in size, and Sandy island moved over a quarter of a mile W.NW., giving eight fathoms of water where the beacon of 1850 stood, and the bifurcation of the bank, bare at low water, west of it. Compared with the surveys of 1839 and 1841, we find that one part of Sandy island has retained the same position, but that a mile, stretching E. by S. ½ S., has been completely cut away, and is now crossed by the south channel.

That the Clatsop spit has changed its shape, trending more to the westward.

And that the western tail of the great middle bank, east of Point Adams, occupies the position of 1839 and 1841.

No survey has been made subsequent to that of 1852, but we can state, from personal observation, that in October, 1857, the south bar was within less than a mile of the beach south of Point Adams, and that the channel ran nearly parallel with, and not distant more than three-quarters of a mile from the shore. It was unavailable with a very heavy sea on, as a vessel had to run it in the trough of the sea, and for sailing with a NW. wind it was a dead beat. We entered the north channel in May, 1857, and found it wide and straight. It was reported to have one fathom more water on the bar than the south. Those of the old buoys that remained were of no use, on account of having been carried from their proper stations.

Conclusions.—From all these examinations, aided by plotting the outlines upon the same sheet and to the same scale, from corroborative evidence, and from personal observation, we find that the south point of the north sands stretching out from Cape Disappointment has remained nearly the same since 1839, bearing S. $\frac{3}{4}$ W. from the light-house, distant $2\frac{1}{2}$ miles; has not varied its position half a mile; has never reached the southern shoal of 1792; and that the bar has never had less than four fathoms upon it, thereby indicating that this entrance and channel is the less changeable, and has a fathom more water than the other, and that, with well-appointed buoys off its entrance, and range beacons on Sandy island and Chinook Point or Scarborough Hill, it will always prove the safer and better for the interests of the country.

The position of the south entrance is continually changing, and the same causes that closed it between 1839 and 1841 will again close it.

The great middle bank, stretching from Point Ellis nearly to Point Adams, remains almost the same since its first determination.

The formation of Sandy island precludes the probability of the channel returning to the capacity which existed at the period of Broughton's survey in 1792.

In 1859 we published the following remarks in relation to river and bay deposits, and especially those forming Sandy island: "A large drift tree whose roots embrace a mass of hard clay or stones sufficient to give the whole mass a slightly greater specific gravity than water may very readily be carried outward by the strong effluent current of the Columbia, and especially in the season of freshets; but when the current slacked the root of the tree would remain upon the bottom, sink into the sands, and continue stationary whilst the remaining movement of the current would be able to shift the loose sand and deposit it around the roots, where it would remain during slack-water. After a slack of half an hour, during which time the waves would give motion to the mass to work it deeper in the sands, the flood current making feebly at first, would then add more sand to the already incipient deposit; should this flood be a small one, or other favorable circumstances conspire, the tree or trees might, during the one slack-water, be firmly enough fixed to resist the action of the flood."

During the heavy freshets, late in 1861, immense trees floated down the river in a nearly perpendicular position, their roots holding amongst them large quantities of earth and stone torn away when the bluff banks were undermined by the rush of the currents. Such causes may have led to the formation of Sandy island.

Hydrographic reconnaissances and views of the entrance to the Columbia river were issued from the Coast Survey Office in 1850 and 1851.

POINTS INSIDE OF COLUMBIA RIVER ENTRANCE.

Sandy island, (1851.)—It is about one-third of a mile long, E.NE. and W.SW., by 250 yards in width, and consists of loose sand raised a few feet above the river, and covered with drift logs, trees, &c. To the westward of it extend two sand bars nearly a mile in length, and bare at low water. The surveys of 1839, '41, '50, and '52 show that this part of the middle bank has occupied one position, and will doubtless retain it. In 1792 the main channel of the river passed over this position, and a line of soundings in five fathoms ran across it. Considering the immense amount of huge trees coming yearly down the river, we can readily imagine the manner of its formation. A large beacon, erected upon it, distinguishable outside the bar, and ranging with another on Scarborough Hill, would serve to denote the position of the north channel.

From Cape Disappointment light-house it bears E. by S. $\frac{1}{2}$ S., distant $3\frac{1}{8}$ miles.

It received its present name from Belcher in 1839. On the Coast Survey charts it is called Sand island.

Chinook Point, on the northern side of the river, lies N. by E. $2\frac{3}{4}$ miles from Point Adams, and E. $\frac{1}{4}$ N. $4\frac{3}{4}$ miles from Cape Disappointment. It is a long, low sand strip at the base of the high wooded hills behind it. One of the hills, called Scarborough, is readily recognized by a great part of its southern slope being destitute of trees and covered with fern; no other hill near this vicinity possesses this peculiar feature.

A number of fishing and Indian huts are situated upon the Chinook beach, the people being engaged in catching and curing salmon, with which the waters abound. The mode of catching them is by means of nets; those of Indian construction being made of twine spun from the fibres of the spruce roots, and sometimes from a peculiar grass obtained from northern coast Indians. The mode of curing is very rude and inefficient, and thousands of barrels that have been shipped have proved worthless. There is no reason why this should not become a large and profitable branch of business. The fish are the largest on the coast, often exceeding 80 pounds weight. We have purchased them weighing between 50 and 60, caught upon the

beach at the sea base of Cape Disappointment. They commence to run about the end of May, and become remarkably plentiful by the third week in June. The Indians suppose that the salmon, coming directly from the ocean, linger about the entrance several weeks before starting up the river, because they require time to become accustomed to the fresh water; attributing to a wrong cause this normal habit of the salmon.

Chinook Point was the special location of the once powerful tribe of Chinook Indians, and here the celebrated one-eyed chief, Concomly, held sway. The tribe has dwindled to less than a hundred persons—men, women, and children—and they are poor, miserable, drunken, diseased wretches.

The point was called Village Point by Broughton in 1792.

In 1839 it was called Chenoke Point by Belcher. The Indian name is Nóse-to-ilse.

Point Ellis, on the northern side of the river, is 2¾ miles, nearly east of Chinook Point; the sand beach between the two being in some places nearly a mile wide, running at the base of the hills, and surrounding a large lagoon near Chinook. From Point Adams it bears NE., distant 4⅓ miles.

Behind Point Ellis rise two hills, the southern of which is used as a range with Point Adams for denoting the entrance to the south channel, but, of course, the relative positions vary with every change of the bar.

It was named Ellis Point by Belcher in 1839, and Point Ellice by the United States Exploring Expedition in 1841, and this spelling is found upon all recent maps.

The Indian name is No-wehtl-kai-ilse.

Point George, on the southern side of the river, is the first point made after passing eastward of Clatsop beach. Immediately behind it the land is high and densely wooded; and around its southern face opens Young's river.

It was called "Point George" by Broughton in 1792; "George Point" by Belcher in 1839; "Young's Point" by the United States Exploring Expedition in 1841; "Smith's Point" by the Coast Survey, in the triangulation of 1852; but it is, we believe, generally known as *Young's Point.*

Astor Point, on the southern side of the river, lies E. ¾ N., distant 5⅓ miles from Point Adams. It is low at the river bank, but has moderately high wooded land behind it. The southern channel passes close to it. The name is derived from a Coast Survey triangulation and secondary astronomical station upon it, but it is in reality a part of Point George.

The geographical position of the station, which is about a quarter of a mile westward of the bay, in front of the town, is:

Latitude	46°	11′	27.6″	north.
Longitude	123	49	32	west.
	h.	*m*	*s.*	
Or, in time	8	15	18.1.	

Tongue Point, on the southern side of the river, bears E.NE. 8¾ miles from Point Adams, and NE. ⅓ E. 3½ miles from Astor Point. It is a high, bold bluff covered with trees, and connected with the main by a moderately low, narrow strip of land. As first made, off the entrance, it appears like a low wooded island. Close to it runs the Woody Island channel, which is plainly foreshadowed in Belcher's survey of the river. The Indian name of Tongue Point is Soo-kum-its-é-ak.

Between the last two points lie the rival villages of Upper and Lower Astoria. The lower is the western, and on the location established by the Pacific Fur Company in 1811, and to which was given the name of Astoria. A large saw-mill is in operation here, and a military post was established, but abandoned a few years since. The place contains less than fifty houses, and at one time, as a landing place, had an unenviable reputation on account of the character of the "beach-combers."

The name of the place was changed to Fort George in 1813, on being taken by the sloop-of-war Raccoon. The original name was restored in 1818.

At Upper Astoria is located the custom-house, off which is the rendezvous of the United States revenue cutter. A large saw-mill is built here, and a government military road is being opened to Salem, on the Willamette river. Between the village and Tongue Point lies the wreck of the Silvie de Grace, around which a shoal has formed.

Cape Broughton is on the north side of the river, N.NW. 3¼ miles from Tongue Point, and NE. ¼ E. 5¾ miles from Ellis Point.

It was named by Belcher in 1839, but was called Gray's Point by the United States Exploring Expedition. This last designation was also applied by the Coast Survey in 1852.

The head between Ellis Point and Cape Broughton was named Chatham Head in 1839.

Gray's bay lies to the NE. of Cape Broughton, and was named, in 1792, in honor of Captain Gray.

Young's bay lies between the eastern part of the Clatsop beach (called Tansey Point) and Point George. Into it empty *Young's river*, discovered, examined, and named by Broughton; Lewis and Clarke's river, examined by them in 1805; and one or two small streams or sloughs.

Baker's bay lies between Cape Disappointment and Chinook Point. It runs 2½ miles to the northward of the cape, and receives the waters of the small streams which head toward Shoalwater bay, and connect with them by a small portage. The western and largest stream is the Wal-la-khut; the eastern, half-way between the cape and Chinook Point, is the Wap-pa-loo-che.

Two or three houses on the shore of the bay, and a saw-mill, are all that remain of the settlement once designated as "Pacific City." The bay was named in honor of Captain Baker, whom Broughton found anchored here in the schooner Jenny, of Bristol, when he entered.

The Columbia river was called the "Oregon" from the mere mention of that name by Carver in 1766. Much doubt exists as to the origin of the name.

In 1775 it was called "Assumption Inlet" by Heceta, but afterwards the Rio de San Roque, from his naming the northern cape San Roque; and also the Ensenada de Heceta.

In 1789 Meares called it "Deception bay."

In 1792 it was named the "Columbia river" by Gray.

Clarke says that, in 1805, the Indians knew it as the Shocatilcum, and another name obtained from another body of the natives was Chockalilum; the two being evidently the same word differently pronounced; the accent should be on the penult.

When the name given by Gray was first changed we cannot state. It was, perhaps, done by Vancouver or Broughton.

Lewis and Clarke, in noticing the growth of trees on the Columbia, mention a fir near Astoria that was 230 feet high, and 120 feet of that height without a branch. Its circumference was 27 feet. This same tree is doubtless referred to in the narrative of the United States Exploring Expedition, where the dimensions are given as follows: 39½ feet in circumference at eight feet above the ground; bark, 11 inches thick; height of the tree 250 feet, and perfectly straight. Visitors used to be shown "the big tree" as one of the notable sights of the locality.

Belcher says that "the timber of the Columbia, either for spars or plank, cannot be compared to that of higher latitudes; for topmasts and topgallant masts it is probably as tough, but heavier. * * * * Probably no part of Western America can produce timber of the dimensions grown in the regions of the Columbia and the northern confines of California. Amongst the *drift* trees, on the banks of the Columbia, we measured one 174 feet long by 20 feet in circumference, and many 150 feet by 13 to 18. These, of course, were washed from the banks, and therefore not the largest, which grow invariably in the thickest part of the wood."—(Vol. 1, p. 300.)

In Baker's bay, in 1851, we measured a drift tree which had been thrown upon the beach. It was 267 feet long, 27 feet in circumference with the bark peeled off, and where broken at the small end 20 inches in diameter. Very frequently, when trees are felled for cutting into lumber, the first 30 or 40 feet of the trunks are found too large for the saw-mill, and have to be cut off and left on the ground.

GENERAL COURSE OF THE COLUMBIA RIVER.

From the entrance to the mouth of the Cowlitz river the general course of the Columbia is E. by N., and the distance in a straight line 46 miles from the bar, and by the windings of the river about 52 miles. The Cowlitz runs N.NW. for 24 miles; thence NE. to its headwaters in the Cascades; it is navigated by canoes about 28 miles to the Cowlitz landing. The stream is very rapid, and boats have to be poled the greater part of the way; at high stages of the water they are pulled up by hauling upon the bushes growing upon its banks. At the Cowlitz landing travellers take mules or horses through to Puget's sound, a trip of 52 miles. On the west bank of the Cowlitz, five miles above its mouth, are a few small houses, locally known as the town of Monticello. On the south bank of the Columbia, opposite the Cowlitz, is another small settlement, called Rainier.

From the Cowlitz the next course of the Columbia is S. 32° E. for 29 miles to the mouth of the *Willamette river**. About 16 miles above the Cowlitz the Warrior branch or slough of the river makes in

* A corruption of the Indian name Wallamut. This stream is the Multnomah of Lewis and Clarke, 1805.

from the west side and runs around Multnomah island, coming into the Willamette two miles above its mouth. The Willamette continues the same general course of the Columbia for 16 miles to the falls, where is situated the town of "Oregon City," destined to become a place of importance, on account of the extensive water-power; the river there falling perpendicularly 38 or 40 feet. Six miles lower down on the Willamette is the rapidly improving town of Portland, situated at the head of ship navigation, with a population of nearly 5,000. The valley of the Willamette is well settled, contains several thriving towns, and is remarkably productive.

The river takes its rise on the western slope of the Cascade range, about latitude 43¾°, between the snow peaks of Mount Jefferson and Mount Laughlin; then runs westward to within 50 miles of the coast, and nearly in the latitude of Cape Perpetua, turning sharply to the northward, and very slowly leaving the coast.

From the mouth of the Willamette the general course of the Columbia to Fort Walla-Walla is NE. by E. ½ E., 170 miles.

Five miles above the Willamette, on the north side, is the military post of Fort Vancouver, which, with the town of Vancouver, covers part of the grounds formerly occupied by the Hudson Bay Company as a mercantile station, but then designated as Fort Vancouver. The Hudson Bay Company still have a trading station here, but their farms and grazing lands have been occupied by settlers. The site for a town is one of the most beautiful on the river, and capitally located for increasing trade.

About 30 miles further up the river we reach the foot of the Cascades, which are a series of rapids four miles long, where the river bursts through the eastern part of the Cascade range of mountains, whose basaltic walls rise precipitously over 3,000 feet on either side, presenting a magnificent sight. Below the rapids the current rushes by with great velocity and depth, but small steamboats ply regularly from Portland and Vancouver to the foot of the rapids; thence passengers are carried by stages to the head, where one or two fine steamboats convey them 50 miles to the Dalles. The Hudson Bay Company carried their large trading boats up the rapids by a system called cordelling. Steamboats have gone up one or two miles, and, in one instance, a brig, with every sail set and a moderate gale astern, was carried safely to the foot of the railroad, which runs from the head to within a mile and a half of the lower end. At each extremity of the rapids are small military posts.

The snow peaks of the volcanic Mount St. Helens and Mount Hood lie exactly in line with the Cascades, the former NW. ¼ N., 35 miles distant; the latter SE. ¼ S., 28 miles distant.

Mount Hood is an extinct volcano covered with cellular lava, and, according to Dana, is between 15,000 and 16,000 feet high. According to other authorities, it attains an elevation of 18,316 feet.

At the Dalles the river is contracted between narrow perpendicular walls, and during freshets rises 100 feet above its ordinary level.

East of the Cascades the forests cease, and above the Dalles stands the only tree in a stretch of 60 miles beyond Walla-Walla, where the river makes a great bend to the northward, in the direction of its source at the base of the Rocky mountains.

On the lower part of the Columbia and Willamette many saw-mills have been erected since the gold discovery in California, and a large trade was carried on in lumber. Between San Francisco and Portland a very large and increasing general trade exists.

The weather off the Columbia entrance is cold and wet, with occasional thunder-storms, but these are rare. Vancouver says he saw several water-spouts off it in October, 1792; some of them were quite near his vessel.

SHOALWATER BAY.

The bold cliffs of Cape Disappointment, after extending about three miles northward, change suddenly to a low, broad, sandy beach, running N. by W. ½ W. 18 miles, in nearly a straight line to the southern point of the entrance to Shoalwater bay. A mile and a quarter behind this beach lies the southern arm of the bay. Its waters reach within a mile or two of the north side of the cape, and the portage from them to the Wappalooche, emptying into Baker's bay, is said to be about a mile long, and always used by the Indians and settlers. The peninsula thus formed is covered with trees and a dense undergrowth of bushes. Within half a mile of its extremity it becomes very low and sandy, and has a covering of coarse grass, but no trees. This point was called Low Point by Meares in July, 1788. On the recent Coast Survey charts

it is named Leadbetter Point. The Indian designation is Chik-lis-ilh. Its approximate geographical position, as given by the Coast Survey, is:

Latitude	46°	36′	45″	north.
Longitude	124	00	45	west.
	h.	m.	s.	
Or, in time	8	16	03.0	

The computed magnetic variation, 20° 35′ east, July, 1851, with a yearly increase of 1′.

CAPE SHOALWATER.

From Leadbetter Point the north cape bears NW. by N. ⅔ N., 5½ miles distant. Half a mile of the cape is low, sandy, and destitute of trees, but some tolerably high land covered with wood rises immediately behind it, being the only elevated ground between Cape Disappointment and Point Grenville that approaches the shore-line. On account of this formation of the point it has been said that the entrance resembles that of Columbia river. We have been unable to detect any resemblance after passing near it several times. The isolated position of Cape Disappointment and the seaward face of its bold cliffs without trees form a peculiar feature. This, with Scarborough Hill, partly bare, lying five or six miles east of it, the high mountains inland, and in clear weather the beautiful snow-peak of Mount St. Helens, have no counterparts at Cape Shoalwater, and should remove all doubt in regard to general resemblance.

The point was named Cape Shoalwater, and placed approximately in latitude 46° 47′ by Meares in July, 1788. In 1792 Vancouver assigned the latitude of 46° 40′. It was viewed from the north side of Cape Disappointment by Lewis and Clarke in 1805, and called Point Lewis, but is now frequently known as Toke Point, from the name of an old Indian chief living here in 1854. The Indian name of the point is Quahpt-sum.

LIGHT-HOUSE AT CAPE SHOALWATER.

The light-house at the north point of the entrance to Shoalwater bay is a structure consisting of a keeper's dwelling, with a tower rising through it and surmounted by an iron lantern, painted red. Its height is 41½ feet above the ground, and about 87 feet above the mean level of the sea. The dwelling and tower are plastered and whitewashed, and situated about a mile from the extremity of the cape. The illuminating apparatus is of the fourth order of Fresnel, shows a *fixed white light varied by flashes*, and should be seen from a height of—

10 feet at a distance of 14¼ miles.
20 feet at a distance of 16 miles.
30 feet at a distance of 17 miles.

It was first exhibited on the 1st of October, 1858, and shows from sunset to sunrise. The approximate geographical position of the light, as determined by the Coast Survey, is:

Latitude	46°	44′	11″	north.
Longitude	124	02	24	west.
	h.	m.	s.	
Or, in time	8	16	09.6.	

This light is sometimes known as Toke Point light. It was discontinued September 1, 1859, and relighted (date not known.)

The topography of the vicinity has not been executed.

ENTRANCE TO SHOALWATER BAY.

There having been no survey of Shoalwater bay previous to the preliminary one of the Coast Survey in 1852, and the completion of it in 1855, it is impossible to state what changes have taken place. Judging by the changes of the Humboldt, Umpquah, and Columbia bars, we should conclude that similar effects take place here. In less heavy weather than would cause the sea to break on the Columbia river bars, it breaks here with fury quite across the entrance. This description applies to 1852. Charts have been published by the Coast Survey of the respective dates already mentioned.

Four miles off the entrance a depth of 10 fathoms is found, and when well off shore a high double-peaked mountain shows to the eastward, well inland. Meares noticed it, and placed it in latitude 46° 30′, quite close

to the coast, designating it as Saddle mountain, a name it still retains, although one of the same name is found SE. of Point Adams.

At the present time there are two channels, denominated from their position the *north* and *south channels*, with a large shoal called the *middle sands* lying between them, and partly outside of the line joining the two points.

The bar at the *south channel* has four fathoms of water upon it, is a mile wide, and lies two miles off the beach south of Leadbetter Point, with the northernmost trees bearing NE. by E. Running in on this line a vessel shoals her water from 10 fathoms three miles off shore, to 4 fathoms two miles off; then gradually deepens it to 5 fathoms, when she should haul close up under the point of breakers northward of her, and about half a mile distant; run along in from 6 to 7 fathoms until abreast of the low grassy point, when the course of the channel will be N. by W. ½ W. for 1½ mile, with from 8 to 10 fathoms, hard bottom, its outline being well marked by the breakers outside. From thence a course NE. by N. for two miles will lead to 18 fathoms, and over a mile inside the line joining Leadbetter Point and Cape Shoalwater, the western trees on Leadbetter Point bearing S. ½ E., 3¾ miles distant. If the tide is low, sand bars and flats will show on both hands, one directly ahead; the broad deep channel to the southeast distinctly marked by bare patches on either side, and a narrow deep channel to the northwest running into the north channel. From the last position the western trees on Leadbetter Point bear south, distant four miles. The greater body of water passes through this channel, and the current runs very strong. In summer, with a northwester blowing, it is a dead beat after passing the bar, and in some places the channel is less than half a mile wide between the three-fathom lines. Coasters do not enter it except with a southerly wind, and always pick out the channel from aloft. In summer they have a leading wind out, and start on the first of the ebb.

The bar at the *north channel* has about 3¼ fathoms upon it, and bears SW. by S. ¼ S., three miles from the southern extremity of Cape Shoalwater. It is about a mile in extent within the three-fathom line.

In making the bay from the southward in summer, work to the northward of Cape Shoalwater, then run in and follow the shore outside of the breakers in six or seven fathoms, gradually approaching them, and decreasing the depth to 4½ and 4 fathoms, when the southern side of the elevated ground of the cape bears NE. by N. ½ N. Then head up as near that course as possible, crossing the bar in 3¼ fathoms, and continuing in that depth for at least a mile and a quarter, taking care not to decrease it on either hand. Keep under the breakers on the north side in from 5 to 7 fathoms, hard bottom, and increase the depth to twelve well inside the point, when its southern extremity should bear NW. ½ W., distant 1½ mile. If it is low water, sand banks will show in different directions, and the channels will be tolerably well marked.

The present invariable practice of vessels entering is to seek out the channel from the mast-head. In calm weather the channels must be known, or a pilot employed, if one is to be found.

The north bar bears NW. by N. ⅔ N., distant five miles.

The *middle sands* lie between the two channels. The southern tail is SW. 1¾ mile from Leadbetter Point, runs NW. by N. ⅔ N. for 2¼ miles, then N.NE. 2¼ miles, and E.NE. 1½ mile, with an average width of 1¼ mile. One mile outside of it soundings are found in 7 fathoms.

This bay, as its name implies, is so full of shoals that at low tides about one-half of its area is laid bare. Good but narrow channels are found throughout its extent, but no direction can be given for running them. Without a knowledge of them, or without a pilot, follow them only at low water. The currents then run with great velocity, and it is very difficult and frequently impossible to keep a course against them. The arm stretching southward toward Baker's bay is 15 miles long from Leadbetter Point, with an average width of not less than 3½ miles, whilst the upper portion stretches to the NE. for nine miles to the north of the Whil-a-pah river, reckoning from the middle of the line joining Cape Shoalwater and Leadbetter Point.

The principal stream emptying into the bay is the *Whil-a-pah*, at its northeast part. At about nine miles from Cape Shoalwater it is less than a quarter of a mile wide, with low swampy banks and steep bluffs on each side about a mile and a half apart.

The mouth of the *Palux*, or Copalux, lies five miles NE. ½ E. from Leadbetter Point. It is half a mile wide at its mouth, contracts very much in two miles, and is bordered by marshes, with numerous sloughs running through them.

The *Násal* enters about eleven miles south from the Palux, and abreast of the middle of Long island. It has over 20 feet water at its mouth, with bluff banks for some distance, until it begins to expand, when it is bordered by flats.

Several streams open from the north side of the bay. One of these, the Necomanche, near the Whil-a-pah, has six feet in the main channel, and shows 1½ mile wide at high tide.

There are three islands in the bay. *Pine island*, about 1½ mile NW. by N. off the mouth of the Palux, is a small sand islet of only four or five acres in extent, and occupied by oystermen. It is near the channel and oyster beds which stretch for a couple of miles to the N.NE. of it. The Indian name of this island is Nass-too. The north end of *Long island* is eight miles from Leadbetter Point. This island runs irregularly about SE. for six miles, and has an average width of 1½ mile. It is covered with a dense forest of fir and under-growth. One mile S.SE. of Long island is a very small islet called *Round island*, of only a few acres in extent, covered with wood and bushes. The shores of the bay, except on the peninsula, are mostly composed of low, perpendicular cliffs of a sandy clay, in which are strata of recent fossil shells and the remains of trees. Where the faces of the cliffs are not washed by the waters of the bay they slope gently, and have a small grassy shore at their base.

NE. ¾ N., distant six miles from Leadbetter Point, is a sharp narrow cliff, 60 feet high, making out into the bay, which is wearing it away, and has exposed many large basaltic boulders. No other place on the bay presents this geological feature.

The *peninsula* is a long, flat, marshy, and sandy plain, elevated but a few feet above the level of the sea, and covered, like the entire surface of this country, with a dense growth of gigantic forest trees, principally spruce, fir, and cedar, with a few specimens of maple, ash, and black alder. The spruce frequently attains a diameter of eight feet. The Indian name of the peninsula is Tee-choots.

The shoals are covered with shell-fish, among which the oyster is the most abundant, and the principal article of export. They are small and have a coppery taste. Codfish and halibut abound; sturgeon, said to be of good quality, are plenty, and salmon of several varieties and excellent flavor exist in infinite numbers. In spring vast shoals of small herring enter the bay. In winter wild fowl are innumerable, but these have been made shy by the bad shooting of the Indians. Black and white swan, geese, mallards, canvas-backs, &c., always reward the experienced sportsman.

The yearly shipment of oysters is about 30,000 bushels, and of piles and spars about 30,000 feet. The average valuation of exports is $120,000. The number of vessels entering yearly is about 25, nearly all of which are schooners, counting an aggregate of 2,500 tons. In 1855 the population on the bay was 190 males and 60 females.

This bay was discovered by Lieutenant John Meares, July 5, 1788, in the Felice, when proceeding in search of the Rio de San Roque of Heceta. He approached it until the water shoaled to eight fathoms, when the breakers ahead warned him to haul off. "From the mast-head it was observed that this bay extended a considerable way inland, spreading into several arms or branches to the northward and eastward, and the mountainous land behind it was at a great distance from us." He saw "what appeared a narrow entrance at the northwest part of the bay," but it was too remote for him to discover whether it really was so, or only low land. "From under the [low] point a canoe came out, containing a man and boy," &c. Unsettled weather prevented his sending in the long-boat to sound near the shoals, in order to discover whether there was any channel. He called it Shoalwater bay.

Vancouver endeavored to enter in 1792, but, as it was breaking across the whole entrance, he considered it inaccessible to his vessels. He says, "The sandy beach was bordered by breakers extending three or four miles into the sea, and seemed to be completely inaccessible until 4 p. m., when the appearance of a tolerably good bay presented itself," and the point to the north was "somewhat more elevated than the rest of the coast," and in latitude 46° 40′.

It is not laid down on the coast chart of the United States Exploring Expedition.

It is asserted by settlers here that boats, canoes, &c., which have broken adrift and gone out of the bay, have, in every instance, been found on the beach north of the entrance, and generally between it and Gray's harbor.

From Cape Shoalwater to Point Hanson, the southern side of the entrance to Gray's harbor, the distance is 13½ miles, and the hard ocean sand beach furnishes an excellent road that can be travelled at half tide by wagons. The slightly elevated sandy bank is level, covered with coarse grass, and free from timber for nearly half a mile back, and to within two miles of the harbor. Back of this and parallel with the coast is a cranberry meadow, six miles in length, and separated by a narrow belt of scrubby fir. This meadow is drained by two small rivulets forcing their way through the sand to the ocean. San Francisco is the market for the cranberries, which are gathered by Indians and carried to Shoalwater bay and Gray's harbor. Land otter and beaver have their homes around the meadows and small streams.

GRAY'S HARBOR.

In our description of this bay we can state nothing from personal experience. It is drawn up from the reports accompanying the recent surveys of 1860, '61, and '62, and accounts received from persons who have examined it.

The entrance to the bay is formed by *Point Hanson* on the south, and the southern point of *Eld island* on the north. The northern end of this island is connected with the outer part of *Point Brown* at low water, but at high tide the beaches are one-quarter of a mile apart. The south end of the island lies N. 59° W., $1\frac{5}{8}$ mile from Point Hanson; its length is $1\frac{3}{4}$ mile, and direction N. 50° W., with a breadth of two to four hundred yards. Half-way between Point Hanson and the island lies the northeast end of a shoal or middle ground, bare at low water, and stretching S. 15° W. for $1\frac{3}{4}$ mile, with an average breadth of three-eighths of a mile. Between the northeast end of this shoal and the south end of Eld island passes the channel, with a width of less than five-eighths of a mile and a depth of 16 fathoms.

We cannot state the position of the bar with relation to any of the above points.

In 1860 the surveying brig Fauntleroy, drawing ten feet of water, laid off the bar several days, the heavy breakers along the whole shoal allowing no clue to the bar, and the depth of water upon it unknown. At a comparatively smooth time the bar was sounded with a boat and the vessel followed, crossing on the last quarter of the ebb with $2\frac{1}{2}$ fathoms. In 1861 the entrance was reported tolerably good, and comparing favorably with the other bar harbors north of San Francisco. In June, 1862, the same vessel laid off the bar several days, and finding no possibility of crossing, ran into Shoalwater bay, and the party being unable to procure a pilot that could carry her into Gray's harbor, had to work from the former bay. There were only three days during the season when work could be executed on the bar, and the result showed that no well-defined channel then existed across the bar, which was very uneven, lumpy, and in one place had only nine feet upon it. The channel was not straight, as anticipated, but the seaward end curved well to the northward. The Coast Survey chart of the entrance is about to be published.

At the time of Whidbey's survey, under the orders of Vancouver, a bar existed off the entrance, having the following position: From Point Hanson, SW. by W. $\frac{1}{2}$ W., $3\frac{1}{2}$ miles distant, and from Point Brown, SW. by S. $\frac{1}{4}$ S., four miles distant. He does not give the depth of water on the bar in his chart, but in the narrative states it to be three fathoms. From this bar the channel was a mile wide, and straight to the entrance between the points, was well marked by the breakers, and had from 4 to 10 fathoms in it until nearly abreast of the points, where it was contracted to half a mile, and the depth increased to 14 fathoms. Then it opened suddenly to both points, with from three to six fathoms between them. The course in, over the bar and through mid-channel, was NE. $\frac{1}{4}$ N., for $3\frac{1}{4}$ miles to between the points, with two low sand islands in range on the course, and $6\frac{1}{2}$ miles from the bar. A narrow channel existed on either side of these islands towards the Chehalis; the southern channel having from three to four fathoms, and that on the north side five or six.

Whidbey believed the bar to be shifting, there being a very apparent difference in the channel between the times of his arrival and departure, when it seemed to be wider and shoaler. A dry sand bank which lay bare near their anchorage on the first evening, on the north side of the channel, was, at his departure, entirely washed away by the violence of the sea, which had broken incessantly upon the shoals and bar.

In the indentation southeast of Point Hanson lay an island with a channel on either side, but that on the west was the better. Both led to the mouth of a small stream coming in from the east. He also gives a four-fathom channel on the east side of Point Brown peninsula, and surveyed two miles up.

In 1841, in the survey by the United States Exploring Expedition, we find no island in the middle of the bay, nor any east of Point Hanson, but a large one $1\frac{3}{4}$ mile long by half a mile wide in the middle of the entrance, and connected by a shoal with Point Brown, whilst the channel ran between the island and the southern point. The bar bore SW. $2\frac{1}{4}$ miles from Point Brown, and west $2\frac{1}{2}$ miles from Point Hanson, with a depth of about three fathoms. This position shows that the bar had moved to the N. by E. no less than two miles. According to that survey, the course for crossing the bar was to bring Point Hanson to bear east and run for it, the channel being straight.

From a study of the map of that survey, we are satisfied that the soundings were carried outward to the inner edge of the bar, and not across it, the lines being probably stopped by the breakers.

The foregoing examinations verify our statement in 1858, that the changes are so great that the directions of one season for entering cannot be relied upon for the next. We have been off the bar, but never saw a fair chance for entering.

The Superintendent of the Coast Survey has recommended to the Light-house Board the placing of buoys to mark the channel, and especially of one on the seaward extremity of the south sands, where the water probably breaks during heavy weather in winter, so much as four or five miles off shore. This buoy would be of great service to the coasting steamers.

In 1860, while the surveying vessel was lying off the bar, a current running to the northward at the rate of 1½ mile per hour was distinctly noticed. An experience of two years has proved the set of the current along the coast to be always to the northward. Immediately off the harbor this current strikes the ebb current of the bay and deflects the mass of water to the northward, and carries the channel that way With the flood current the mass of water sets over the south sands. It is estimated that the off-shore current runs across the bar at an average rate of three miles.

The Indians use a small swash channel under Point Brown to avoid crossing the bar.

The peninsula terminated by Point Hanson is about three-quarters of a mile in breadth and 3½ miles long, and covered with fir to within half a mile of the point, which is a low sand spit embracing a small marsh. The general direction of the peninsula is northwest, and inside of it lies *South bay*, with a width of half a mile, affording the safest, and in fact the only safe anchorage near the entrance. More than half of this bay is occupied by mud flats. To secure the best position here, bring the northernmost trees on Point Hanson to bear S. 71° W., distant three-quarters of a mile, and anchor in the channel in 3½ fathoms. This position places the vessel out of the influence of the south channel running to the Chehalis.

The anchorage under Point Brown is not only uncomfortable but unsafe to a vessel without heavy ground tackle. At this point there is no protection against the full sweep of the heavy summer winds, which, blowing at times counter to the strong currents in the bay, cause a very disagreeable, short sea. Another circumstance tends to render this anchorage unsafe: between Point Hanson and Eld island lies the middle shoal, which, being bare at low water, confines the waters to a narrow regular channel; but when the tide rises sufficiently to cover this shoal the conflicting currents cause a heavy overfall, especially on the large tides, strong enough to tear a vessel from her anchors. This happened to the surveying brig in May, 1860.

The peninsula, terminated by Point Brown, is about a mile in breadth and 4½ miles long; its general direction is SE. by S. The bay shore is covered with fir. The outer shore is the commencement of a sand waste, stretching towards the Copalis river. Between the timber and this waste is a large pond or lagoon, and outside that the sand is covered with coarse beach grass and stunted lupine bushes, and cut up with the tracks of bears, cougars, wolves, elk, etc. From the north end of Eld island a body of water stretches into the sand waste parallel and near the ocean beach for about a mile. Close under the bay shore of this peninsula runs a narrow crooked channel, which Whidbey surveyed for two miles, and in which he gives four fathoms.

The secondary astronomical station of the Coast Survey is on the extremity of the fast land of Point Hanson, and within ten feet of the marsh. Its geographical position is:

	° ′ ″
Latitude	46 53 48.9 north.
Longitude	124 06 42.3 west.
	h. m. s.
Or, in time	8 15 26.8.

The computed magnetic variation for 1862 is 20° 53′ east, with a yearly increase of 1′.

From Point Hanson the mouth of the Chehalis river bears N. 52° E., distant 12 miles; and this course is the general direction of the southeast side of the bay, except the indentation forming South bay. The first bluff inside the point is *Stearns*,* bearing N. 57° E., and distant 5½ miles. Around the southwest side of this bluff comes John's river. Within a mile and a half of the mouth of the Chehalis the Neuskah'l enters, coming from the southeast.

From Point Brown *Point New*† lies N. 39° E., distant 4¾ miles, and having off it two rocks, now called Ned's rocks, and marked on Whidbey's chart.

Brackenridge bluff‡ commences about three-quarters of a mile east of Point New, and extends three miles eastward to the low land bordering the Hoquiamts river. From Point New the shore-line runs nearly straight to the Chehalis, distant eight miles, and the point of Stearns bluff lies S. 43° E., distant 4¼ miles.

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* Named by the United States Exploring Expedition, 1841.

† Named by Whidbey in 1792.

‡ Named by the United States Exploring Expedition, 1841.

To the N.NW. of the line joining Points New and Brown lies *North bay*, consisting of an immense mud flat, bare at low water, and having an area of 22 square miles. At the head of it lies Saddle hill. In the stretch of four miles northwest of Point New are three small streams, called the Typso, Chinois, and Humtolapy, emptying into North bay. They work narrow crooked channels through the mud flats, but at low water there is not sufficient depth to carry a whaleboat through them.

By measurement we find that more than nine-tenths of Gray's harbor is bare at low water. Inside of the entrance the area of the surface of the water, bounded by the flats, bare at low tide, is only 4½ square miles. This will give a fair idea of the limited extent of the harbor. Through the flats lying between this available space and the Chehalis run two contracted channels. The northern commences at a point two miles N. 67° E. from Point Brown, is the only available one, and would require bouying out for its entire length. For about six miles it is three-eighths of a mile wide, with a depth of four fathoms. The south channel commences just inside Point Hanson, and is very contracted and shallow. The flats are so extensive, and the mud so soft in places, that it is impossible to reach the shore, except at high tides. This fact has retarded the development of the trade in lumber, although the shores are heavily timbered.

The trade of the bay amounts to carrying the supplies needed by a few settlers, and by the small military post on the Chehalis. During seven months in 1860 this reached one hundred and twenty-five tons.

The *Chehalis river* has been navigated by a small steamboat for 20 miles, to the mouth of the Latsop, which comes from the northward. This is the head of tide-water; but enterprise would render the river navigable much higher. Boats have come from the bend of the Chehalis, at the mouth of the Skookumchuck, near the road passing from the Cowlitz river to Puget's sound. The country behind the bay appears low and flat, and well watered by the Chehalis and tributaries, which drain a section well timbered and dotted with many small prairies and bottom lands.

In the winter of 1852–'53 the brig Willimantic was driven ashore upon Eld island, having mistaken this for Shoalwater bay. After vainly attempting to launch her toward the sea she was dragged across the island and launched on the bay side. Then the island was a mere bank of sand, bare at all tides, and covered with logs and drift-wood.

The bay was discovered by Gray in May, 1792, and named Bulfinch harbor, after one of the owners of his vessel. He placed it in latitude 46° 58′ north.

It was surveyed by Lieutenant Whidbey, in the storeship Dædalus, October, 1792, under the directions of Vancouver. He first sent in his boats, and then crossed the bar in three fathoms, with the ebb current running so strong that, although the ship was making nearly five knots an hour, little actual progress was made. He applied the present name, Gray's harbor, in compliment to its discoverer. On some old maps we have found it called Whidbey's harbor. He named Point Hanson after the commander of the Dædalus, and the northern point he called Point Brown, placing it in latitude 46° 59⅓′ north.

The southern point was called Point Chickeeles by the United States Exploring Expedition in 1841, and placed in latitude 46° 55′ 30″; and the same name was applied to the river.

In the first maps of the Coast Survey the southern point is termed Point Harrison—a clerical error. Among the few settlers in this region it is called Point Armstrong.

The name of the river is derived from the Indian tribe inhabiting the bay and river. They pronounce it Tché-hæ-lis or Tsi-hæ-lis, signifying sand.

For January, 1859, the *line of equal magnetic variation* of 21° east crosses the coast line in latitude 47° 08′, and in latitude 46° 58′ it crosses the 125° of longitude. This line moves annually a mile and a half to the southward.

COPALIS RIVER.

We know nothing of this stream except from settlers who have passed it in travelling along the shore.

From Point Brown the shore-line trends about N.NW. for ten miles to the mouth of the Copalis. The barren waste of Point Brown continues along this shore, commencing with a breadth of over one mile, stretching from the ocean to a dense forest of fir, and growing narrower as it approaches the Copalis, where the timber comes to the water's edge.

This stream is about 100 yards wide, but the mouth is almost closed by a bar. Upon its banks reside the Copalis tribe of Indians, from whom the river derives its name. Like all the streams on this coast it abounds in salmon, but those caught here are celebrated for their richness of flavor. Their general appearance

is similar to those of the Columbia river, but this variety rarely exceeds two feet in length. They weigh from five to ten pounds.

In or about October, 1854, there was discovered one mile north of the Copalis the whole stern frame of the propeller General Warren, which had been wrecked on Clatsop spit, at the mouth of the Columbia river, more than two years previously, having thus been carried by currents at least 60 miles from its original position. When the hydrographic survey of the entrance to the Columbia was made by the Coast Survey parties in 1852 this wreck was found and its position determined. From Cape Disappointment it bore SE. by E. almost four miles distant, and was consequently little more than a mile from Point Adams. It then rested on the north edge of the Clatsop spit. This shows a direction of the current, corroborating Vancouver's account when anchored off Destruction island, and agreeing with our experience.

POINT GRENVILLE.

From the Copalis to this point the shore runs NW. ½ N. about 16 miles, and continues low, nearly straight, and bordered by sand beach, which changes to shingle, disposed in long rows parallel to the coast. These ridges of shingle dam the mouths of many small streams and form ponds, abounding in trout, and well stocked with beaver and otter, according to the accounts of the Indians. The high land also approaches much nearer the beach, and forms sandstone cliffs, with rocky ledges projecting into the ocean.

Point Grenville is a bluff, rocky promontory, stretching westward about a mile, and then southward about a quarter, forming a very contracted and exposed roadstead; with the three-fathom curve extending half a mile from the beach, compelling vessels, except of very light draught, to anchor so far out that the point and the rocks off it afford but little protection from the northwest winds. It is useless during the winter months. The point has high hills lying behind it, and many rocks immediately off it. Two of these, about 75 feet high, lie E. by S., 400 yards distant; another lies SW. ¾ S., half a mile distant. This, we believe, is the one that shows a large perforation through it when viewed from the southeast or northwest. It has five and six fathoms all around it. Others stretch along the coast to the northwest, one of them showing from the south as a leg-of-mutton sail. The bluff itself is composed of fine sandstone, is very steep, and may be ascended by a difficult trail, which is used by the Indians. It is said to be a great resort for sea otters, which are hunted by the natives.

Its approximate geographical position is:

	° ′	
Latitude	47 20	north.
Longitude	124 14	west.
	h. m. s.	
Or, in time	8 16 56.	

From Cape Disappointment light it bears NW. by N. ½ N., distant 62 miles, and from the cape soundings may be had in from 8 to 15 fathoms, three or four miles from the shore.

This point is said to be the Punta de Martires of Heceta and Bodega, because in latitude 47° 20′ seven of the crew of Bodega's vessel, the Señora, were massacred by the natives.

It received its present name in 1792, from Vancouver, who placed it in latitude 47° 22′, and describes as lying off it "three rocky islets, one of which, like that at Cape Lookout, is perforated."

North of Grenville to Cape Flattery the shore is bold and rocky, with occasional short reaches of sand beach. The timber comes down to the water; moderately high hills approach the coast, through which empty numerous small streams, whilst the irregular Olympus range looms up far in the interior. In winter these mountains are covered with snow, which lies in the gorges and valleys nearly the whole summer. *Mount Olympus* is the highest peak of the range. It attains an elevation of 8,138 feet, according to determinations made in 1841 by the United States Exploring Expedition, which placed it in latitude 47° 45′ N., and longitude 122° 37′ W.

It is said to have been first seen by Perez, in 1774, who placed it in 47° 47′ N., and called it La Sierra Santa Rosalia, but the account of his voyage was not published until many years after that date, (1802.)

It was next described by Meares, in 1788, and placed in latitude 47° 10′, the error arising from its bearing, and he supposing it much nearer the coast-line than it actually is. In his sketch it is marked quite close to the shore, in latitude 47° 15′ N. He called it Mount Olympus, the only name by which it is now known.

In 1792 Vancouver determined its position approximately, and gave the latitude as 47° 50′ N.

Qué-ni-ūtl river. The mouth of this small stream is between three and four miles NW. by W. from Point Grenville, and is almost closed by the shingle and gravel thrown up by the surf; there is, however, a contracted opening for the passage of canoes in calm weather. The closing of the entrance has so dammed the river as to form a small lake inside, upon the banks of which is situated a village of the Queniutls, a race of Indians hostile to all other tribes. Combined with others to the northward they have ever been notorious for their hostility and vindictiveness to the whites. Several Spanish, English, and Russian vessels and their crews were, in former times, taken and destroyed. Hence we meet with the names Destruction Island, Isla de Dolores, Punta de Martires, &c., in this immediate vicinity. The river is said to head in a lake at the foot of the mountains.

The name of this river is usually known by the old settlers as Qué-noith, but the Indians are said to pronounce it as if spelled Qué-ni-ūtl, accenting the first syllable strongly, and the last so softly that many persons consider they call themselves simply Que-nai. A tribe still further north is called the Que-nait'-sath. The Mukkaws call it the Quin-aitl. De Mofras calls it "Kiniat."—(See remarks, next page, Destruction island.)

These Indians, when travelling by canoes along the low sandy beach south of Point Grenville, push out into the rollers, keep between the line of two seas that have broken, and pole the canoe through the surf. This peculiar mode is rather apt to excite the fears of those ignorant of what a canoe can be made to do when skilfully handled.

For four miles above the Queniutl the coast trends in the same direction, NW. by W., is composed of sandstone cliffs, and bounded by many precipitous rocks, the height and direction of which are generally that of the cliff. In the Coast Survey reconnaissance of 1852, one is placed 2½ miles off shore in latitude 47° 27′, and the vessel's track is laid down inside of it. A great many large rocky islets lie close in shore in this vicinity, but northward the coast is nearly clear to Destruction island. It makes a slight curve eastward, and alternates with bold yellow cliffs and low shores.

DESTRUCTION ISLAND.

This island is the only one found deserving the appellation after leaving the Farallones. It is about 150 feet high, quite flat on the top, covered with grass, but destitute of trees, and has high perpendicular sides of the same height as the cliffs on the main. It is said that there are some remarkable perforations through a rock near it, but these are, doubtless, only seen in particular directions, for, in passing close to it, we have never noticed them. On the eastern end were formerly some rude Indian huts. In Vancouver's time he found two or three dwarf trees at either end.

In running along the coast, 10 miles off, it is very difficult to make out this island, because, being within 1½ mile of the main, it is projected against the coast cliffs and cannot be distinguished from them until close upon it. It is narrow, but about 1½ mile long in a N.NW. direction, running parallel with the coast, and has rocks for a mile off its southern end. A reef and sand bank is represented as stretching thence W.NW. three miles to broken water, and from there running nearly straight to the northern end. A detailed examination of this locality might prove that good refuge could be had under the island during heavy southeast and southwest weather. No winter harbor of refuge exists between Point Reyes and Neé-ah bay, unless this be such, in which case it is of very great importance.

Between it and the main the soundings range from 7 to 12 fathoms, and to the northward from 10 to 14.

The approximate geographical position of the north end is:

Latitude	47° 41″	north.
Longitude	124 25	west.

From Cape Disappointment it bears NW. by N. 84 miles.

This island is called Isla de Dolores upon old Spanish maps. It received its present name, by which it is only known on the coast, in 1787, from Captain Berkely, who sent a long-boat from King George's sound to explore as far south as latitude 47°. The crew of a smaller boat entered a shallow river and rowed up some distance, where they were attacked and murdered by the Indians.

In April, 1792, while Vancouver was at anchor in 21 fathoms, 3½ miles S.SW. of this island, he "had calms, and found a constant current, without intermission, setting in the line of the coast to the northward." After passing Cape Orford he had been regularly thus affected, and carried to the north 10 to 12 miles per day further than was expected. He gives the latitude of the island as 47° 37′ north.

W. by N., distant 16 miles from Point Grenville, we discovered, in June, 1855, a bank having 15 fathoms upon it, with very soft mud bottom; at 21 miles distance, 17 fathoms; and at 29 miles, 36 fathoms; and three miles S.SE. of the first position we struck 16½ fathoms, with the same bottom, in all the soundings; but had not time to make an extended examination. In April, 1856, we found 45 fathoms in latitude 46° 54′ N., longitude 125° 03′ W., being 16 miles broad off shore. The soundings of 17, 18, and 19 fathoms, one mile from shore, would indicate a greater depth than we obtained. Vancouver has 50 fathoms inside of our first soundings.

From Destruction island northward the shore is composed of cliffs which form a regular curve to a point bearing NW. ½ W. from the north end of the island, and 11 miles distant; thence the shore runs nearly straight on that course for 10 miles to two high, abrupt, and well-marked rocks, standing a mile from shore. The outer one is bold and covered with tall trees, but the inner one is bare. They are in latitude 47° 58′, longitude 124° 40′. Many others, but smaller, lie inside of them, and 19 fathoms are found close outside. Along this stretch the shore is irregular and bluff, with many high rocky islets off it. A stream opens about midway in the stretch.

In the indentation northward of Destruction island, and about four miles from it, empties a small stream, which we believe is called Hooch by the Indians.

Meares calls the curve of the coast, about Destruction island, "Queenhythe bay," evidently a corruption of the Que-ni-utl, or Que′-noith.

FLATTERY ROCKS.

From the two rocks just mentioned to Cape Flattery, in 48° 23′, the course is almost N.NW., passing through a group of high, well-marked, rocky islets, in latitude 48° 12′ N., named the Flattery Rocks. Before reaching these the coast-line curves about a mile eastward, with a bluff shore nearly free from rocks for about eight miles, when a large white rock half a mile out looms up prominently, and is distinctly seen against the main land.

Flattery rocks extend between two and three miles from shore; the outer ledge is awash with one islet in it, and the track of the coast surveying steamer is laid down inside of it, with soundings in 9 to 20 fathoms. High abrupt timbered islets lie inside, with their ocean faces nearly perpendicular, about 150 feet high, and sloping landward. Where destitute of trees, these are covered with grass, bushes, &c. The latitude of the rocks is 48° 12′ north.

In March, 1778, Cook, having been driven seaward by heavy gales off Cape Perpetua, made the land about the latitude of 47° 35′, and four leagues from shore, as he says, when he was in hopes of finding a harbor to the northward under a small round hill which appeared to be an island, but on approaching it he became almost convinced that the opening was closed by low lands, and being thus disappointed, he named the point of land to the north of it Cape Flattery, and placed it in latitude 48° 15′ N. On recent English charts the cape is placed in the position of the Flattery rocks, although Vancouver adopted the present usage on this coast. From an examination of Cook's account, with a knowledge of the coast and the currents here, we are satisfied that he was further north than he estimated on the morning of March 22, for he says the small round hill like an island bore N. ¾ E., (true,) distant six or seven leagues, while the coast extended from N. to SE., (true.) These facts convince us that his position was in latitude 47° 50′, longitude 124° 46′; from this situation the Flattery rocks are distant seven leagues, bearing N. ¾ E., (true;) the extremity of Cape Flattery bearing nearly N., (true;) the distance to the nearest point of land a little more than three leagues; and the coast northward of Point Grenville bearing SE., (true.) The point of land northward of the Flattery rocks was, therefore, his Cape Flattery, and his estimated latitude of it eight miles too small. Before next day he had a very hard gale from the SW., accompanied with rain, and he did not see land again until he reached latitude 49½°. He arrived at the conclusion that between 47° and 48° there existed no inlet, as had been asserted.

From Flattery rocks we find a high rocky coast, bordered by outlying rocks for eight miles, when a low sand beach occurs, receiving a small stream which runs E.NE. and finally north, behind the mountain constituting Cape Flattery, to within 200 yards of the beach in Neé-ah bay. A rise of 20 or 30 feet of the sea would make Cape Flattery an island, extending five miles (W.NW.) by three miles in breadth. This creek is used by the outer coast Indians during the prevalence of heavy winter gales, when the passage outside the cape would be impracticable.

From Point Grenville to Cape Flattery the hills rising from the coast are about 2,000 feet high, densely

covered with trees, and cut up by innumerable valleys. The shore is inhabited by numerous tribes of Indians, accustomed to war and bitterly hostile to the whites. They are far superior to the Indians found along the southern coast. Their villages are heavily stockaded, and the houses made of cedar boards, which they have cut with great industry from the tree. We have measured and found some of these boards to be over 4 feet wide and 20 feet long; the outside edges being about an inch thick and three inches in the middle. Their houses are very large, and partitioned off into stalls for each family. The numerous streams emptying upon the coast afford them a never-failing supply of the finest salmon; and to obtain means of barter with white traders they fearlessly attack and capture the different species of whale on the coast.

TATOOSH ISLAND.

This island lies W.NW. half a mile from the point of Cape Flattery. It is composed of small islets connected by reefs, is quite flat-topped, and without trees. The surface is 108 feet above high water, and the sides are perpendicular; the entire mass is composed of coarse sandstone conglomerate with an outcrop of basalt on one of the reefs. There is a depth of two or three feet of soil upon the top, which was formerly cultivated by the Indians, who resorted here in summer, about 150 strong, and had several houses near the only boat landing on the inside of the island, (1852.) A reef extends a quarter of a mile off the west side of the island, and the whole extent of the island and reef is only half a mile W.NW. by a third of a mile. Deep water is found upon all sides, except between it and the cape, where a reef exists upon which it breaks very heavily in bad weather. We are informed that small vessels have gone through when jammed by an unfavorable wind. In so doing great risk must have been incurred, as the currents in the vicinity run very irregularly and strong.

From the top of the island a leaning rocky column, about 75 feet high and one-third of that in diameter, is seen to the southeastward close under the face of the cape. It is sometimes called Fuca's pillar.

TATOOSH ISLAND LIGHT-HOUSE.

This structure is erected on the highest part of the island, and consists of a keeper's dwelling of stone, with a tower of brick, whitewashed, rising above it, and surmounted by an iron lantern painted red, its height being 66 feet above the top of the island. The light was first exhibited December 28, 1857, and shows every night, from sunset to sunrise, a *fixed white light* of the first order of Fresnel. It is elevated 162 feet above the mean sea level, and in clear weather should be seen from a height of—

10 feet at a distance of 18.2 miles;
20 feet at a distance of 19.7 miles;
30 feet at a distance of 20.9 miles;
60 feet at a distance of 23.5 miles;

so that a vessel from the southward will make it before being up with the Flattery rocks.

The geographical position of the light, as determined by the Coast Survey, is:

Latitude	48°	23′	15.5″	north.
Longitude	124	43	50.0	west.
	h.	*m.*	*s.*	
Or, in time	8	18	55.3.	

Magnetic variation, 21° 46′ east, in August, 1855, with a yearly increase of 1′.

The angle of visibility from the land southward, round by the west to the extreme western visible point of Vancouver island, is 131°, and from the same starting point round by the west, up the Strait of Juan de Fuca, 263°.

This island, with its outlying reef, is the most western portion of the United States.

The present name is that given to us by the Indian tribe (Muk-kaw) inhabiting the cape and outer part of the strait. Their word to designate an island is opichuk't.

On June 29, 1788, Meares, passing the entrance to the strait, hove to off this island, was visited by the Indians, and sent an officer to examine it, who reported that it was a "solid rock covered with little verdure, and surrounded by breakers in every direction." They also "saw a very remarkable rock that wore the appearance of an obelisk, and stood at some distance from the island." To this rock he gave the name of Pinnacle rock. It is the columnar leaning rock already described. He says the "island itself appeared to be a barren rock, almost inaccessible, and of no great extent; but the surface of it, as far as we could see,

was covered with inhabitants, who were gazing at the ship." "The chief of this spot, whose name is Tatooche, did us the favor of a visit, and so surley and forbidding a character we had not yet seen." The Indians evidently gave him the name of the island, which he mistook for that of the chief. His sketch of the island and cape also includes Rock Duncan.

Too-too-tche is the Nootka name for the "Thunderbird." The Mukkaws originaly came from the west coast of Vancouver island.

And here we may be permitted to remark, that from this place to Cape Lookout the descriptions of Meares are confirmed by our own observations.

ROCK DUNCAN.

This is a small, low, black rock rising above the highest tides, but always washed by the western swell, which breaks over it. Deep water is found close around it. From Tatoosh Island light it bears N. 33° W., distant 2,078 yards, or more than a mile, and many vessels pass between them, as the chart shows 25 fathoms; but a rock has been reported in the channel, and it would be well to avoid it until the doubt is set at rest. Vancouver's vessels passed between them. The rock was first noticed by Mr. Duncan in 1788, and placed in latitude 48° 37′ N., which Vancouver, who gave it the present name, considered a typographical error.

During a three months' stay at Neé-ah harbor in 1852, we tried upon several occasions to land upon this rock with canoes, but could never effect our object.

DUNTZE ROCK.

Nearly a quarter of a mile off Rock Duncan, on the line from Tatoosh island, Kellet places a rock having three fathoms water upon it, and to which he gave this name.

With no wind, a heavy swell from the west, ebb current, and proximity to these outlying rocks and island, a vessel's position is unsafe, and great caution should be exercised in navigating this part of the entrance to the Strait of Fuca.

CAPE FLATTERY.

This cape forms the southern head of the entrance of the Strait of Juan de Fuca; it has a bold, wild, jagged sea-face, about 100 feet high, much disintegrated by the wearing action of the ocean; rises in a mile to an irregular hill of 1,500 or 2,000 feet in height; is cut up by gorges and covered with a dense growth of fir and almost impenetrable underbrush from the edge of the cliffs to the summit. The shore-line round to Neé-ah bay is of the same forbidding character, bordered by reefs, and having but one short stretch of beach at the foot of the hills. Upon this beach is situated (or was in 1852) Clisseet's village. The soundings half a mile from shore are deep and irregular, reaching 68 fathoms. The current runs as much as three miles per hour, and during the ebb sets irregularly round the cape, Tatoosh island, and Rock Duncan. When seen from the southwestward Cape Flattery looks like an island, on account of the valley three or four miles eastward. The best position for seeing this is when a single rock off the cape shows itself detached. From this direction the high mountains on Vancouver's island loom up and stretch far away to the northwest and to the east.

The extent of ocean shore-line from Cape Disappointment to Cape Flattery is 148 miles.

The name adopted is that which Cook gave to this headland in 1778. It has been called Cape Martinez by the Spaniards, from its asserted discovery in 1774 by Martinez, pilot to Perez, who announced many years afterward that he remembered to have observed a wide opening in the land between 48° and 49° north latitude.

In 1788 Captain Duncan anchored on the south shore of the Strait of Juan de Fuca, off a village called Claasit, or Claaset, in 48° 30′.

On recent English charts it is called Cape Classet, because, in 1792, Vancouver stated that as the name given by the Indians to distinguish it, but in a marginal note it is called "Cape Flattery." (See remarks on page 110, in relation to this matter—Flattery rocks.) In 1852 we found that the then head chief of the Muk-kaws, a powerful man, about 40 or 45 years of age, called himself, and was called by the tribe, Clisseet', but we could not ascertain whether this was an hereditary title.

On the western coast it is universally known as Cape Flattery.

It was near this cape that a Japanese junk was wrecked in 1833, accounts of which will be found in Belcher's narrative, and in that of the United States Exploring Expedition. See also Schoolcraft's Indian Tribes of the United States, page 217. This wreck, with that at Clatsop Point and others found at sea, shows strongly the direction of the prevailing winds and currents off shore.

BANK OFF CAPE FLATTERY.

At the entrance to the Strait of Juan de Fuca, 15 miles, by estimation, W.NW. from Cape Flattery, we have been informed that a bank exists having 18 fathoms upon it, and, moreover, that during a calm our informant fished upon it from his vessel, and caught a large number of codfish. His attention was called to it by a number of canoes fishing. While we were encamped in Neé-ah bay, in 1852, the Indians frequently went out upon some bank off the strait to fish for cod, but we looked upon their assertions with distrust, and believed they caught the fish inside of the strait. Each season in passing, as we wished incidentally to seek for this bank, we encountered southeast gales, which rendered the examination impracticable.

STRAIT OF JUAN DE FUCA.

The entrance to this strait from the Pacific lies between Cape Flattery and Cape Bonilla, on Vancouver island, which forms the northern shore. Its width is about 14 miles, and the bearing from Flattery to Bonilla NW. ¾ N. From this line the strait runs east for 40 miles, with a uniform width of 11 miles. It gradually contracts to 8 miles between Beachy Head on the north and Striped Peak on the south; changes its direction to E. by N. ½ N. for 15 miles; then expands to the northward, attaining a width of 18 to 20 miles, and divides into two ship channels, the Canal de Haro and Rosario strait, leading through the Archipelago de Haro northward to the Gulf of Georgia. It is terminated on the east by Whidbey island; at the southeast it passes into Admiralty inlet, and is bounded on the south by the main land of Washington Territory, which forms the entire southern shore of the strait. From the ocean to Whidbey island the mid-channel distance is 84 miles. The depth of water throughout the strait is remarkably great, no bottom being found in its deepest parts with 150 fathoms of line. It is the main artery for the waters of Admiralty inlet, Puget's sound, Possession sound, Hood's canal, Canal de Haro, Rosario strait, Bellingham bay, and the vast Gulf of Georgia, extending between Vancouver island and British Columbia for 120 miles, with an average width of 20. Its currents run with an average velocity of not less than three miles per hour, and off the Race island and Beachy Head over six miles an hour. Its shores are bold, abrupt, and covered with a heavy growth of varied timber and dense underbrush. On the north the mountains rise rapidly from the water, and many attain an elevation of not less than 6,000 or 7,000 feet. These are covered with fir to their summits. On the south, for 30 miles from the entrance, the shore is bounded by hills of 2,000 feet height, backed by the jagged Olympus range of 8,200 feet. For the next 50 miles the shore is generally a steep cliff, from 50 to 200 feet high, with a flat country extending nearly to the foot-hills of Olympus, and stretching further south as we move eastward. On the east the face of Whidbey island is very steep; it is about 250 feet high, and appears flat, as does the whole country eastward to the sharp-cut outline of the Cascade range, stretching its serrated ridge northward, where the snow-peak of Mount Baker * is distinctly seen, and to the southward, where the higher peak of Mount Rainier * attracts the eye.

Humboldt calls this Mount Regnier, depending upon the narrative of Frémont, who saw it in active operation, November 13, 1843. We believe it is over 15,000 feet in height.

At the time of our first visit the southern shore of the strait was inhabited by large numbers of Indians, living in heavily stockaded villages. They were tolerably expert in the use of fire-arms, of which they seemed to have a good supply. They lived mostly by fishing, but raised a fair supply of remarkably good potatoes from the stock seed of the Hudson Bay Company.

During dry summers the Indians and settlers set fire to the forests in every direction, and the country soon becomes enveloped in a vast smoke that lasts for two or three months. At such times it is frequently impossible to make out the shore at half a mile distance. The strong westerly winds coming up the strait disperse it for awhile, but only to fan the fires and give them renewed force and activity.

In summer the prevailing wind draws into the strait, increasing towards evening, and frequently blowing a ten-knot breeze before midnight; but unless the wind is strong outside little is felt in the strait, and

* Named by Vancouver, 1792.

very frequently vessels are a week from Cape Flattery to Admiralty inlet, or *vice versa*. In winter the southeast winds draw directly out, and create a very heavy cross sea off the entrance, the great southwest swell meeting that rolling out. In such cases trading vessels try to gain Neé-ah bay or San Juan harbor, and remain at anchor until the wind changes. In beating in or out vessels may run as close under either shore as wind and currents warrant, as no hidden dangers have been found half a mile off shore, except at the west side of the small indentation called Crescent bay, near Striped Peak, 44 miles inside of Rock Duncan.

At the entrance the currents acquire, during the "large tide" of each day, a velocity of four miles per hour, and after strong northwest winds, a very large, short, but regular swell is encountered west of Neé-ah bay during the ebb current. If the wind is light, and no steerage way on the vessel, the feeling is decidedly disagreeable, especially as the current seems constantly to set close around Rock Duncan and Tatoosh island. If a vessel falls into the trough of this swell she is bound to fetch away something.

Settlers are gradually advancing from Puget's sound and Admiralty inlet along the strait westward, and are destined to meet those coming up the coast from Gray's harbor and Shoalwater bay.

Washington Territory has a climate excelled only by that of California. We know not where to point to such a ramification of inland navigation, save in the British possessions to the northward. For depth of water, boldness of approaches, freedom from hidden dangers, and the immeasurable sea of gigantic timber coming down to the very shores, these waters are unsurpassed, unapproachable.

The Strait of Juan de Fuca was discovered by the long-boat of the Imperial Eagle, under the command of Berkely, in 1787.

In June, 1788, it was examined by Meares, in the Felice, he having obtained information of its existence from Berkely. At the entrance it "appeared to be 12 or 14 leagues broad. From the mast-head it was observed to stretch to the E. by N., and a clear unbounded horizon was seen in that direction as far as the eye could reach." He frequently sounded, "but could procure no bottom with 100 fathoms of line." He afterwards sent a party to explore the strait, who went up about 50 miles, determining the harbor of San Juan. He first applied the name "John de Fuca" to the strait.

After the expedition of 1775 several Spanish expeditions were fitted out for exploration in these latitudes, but we are not sufficiently acquainted with their results to state their claims and merits. Haro was in the strait in 1789, Quimper in 1790, Eliza in 1791, and Galiano and Valdez in 1792.

Gray entered the strait in 1792, penetrated 50 miles in an E.SE. direction, and found the passage five leagues wide. He gives the latitude of Tatoosh island, or Cape Flattery, 48° 24′. The extracts from his log-book, stating particulars of this and the Columbia river exploration, were not made public until 1816. Most of Gray's latitudes, distances, and courses, are good and trustworthy.

Vancouver entered the strait in 1792, and gave to the world the first detailed and authentic account of it.

THE SOUTHERN SHORE OF THE STRAIT OF JUAN DE FUCA.

NEÉ-AH BAY.

Koitlah Point, the western boundary of this bay, is four miles E. by N. ⅜ N. from the light-house on Tatoosh island. From Cape Flattery the shore is nearly straight, high, and rugged, backed by hills about 1,500 or 2,000 feet high, and covered with timber. Deep water is found within a third of a mile of the bluffs, and at a distance of half a mile, a depth of 20 fathoms is obtained. Within a mile of Koitlah Point was a large village of the Mukkaws, (1852.)

The bay is about a mile and a quarter long S.SE., and the same in width at the entrance. The western side is high, precipitous, and bordered by craggy outcropping rocks 300 or 400 yards from the shore. The three-fathom line ranges about 600 yards from the foot of the bluff. The general direction of this side is SE. for one mile, when the hills suddenly cease, and a low shore, with sand beach backed by woods, curves gradually to the NE. by E. for a mile and a quarter to Ba-ad-dah Point, formed by a spur of the hills.

The east side of the bay is formed by Waaddah island, the northern end of which lies 1½ mile from Koitlah E. by N. ½ N. This island is a narrow, high ridge, about 250 yards wide, and half a mile long, covered with trees, and having a direction SE. ¼ E., pointing toward Ba-ad-dah Point, and presenting the appearance of a continuation of that spur, but separated from it by a four-fathom channel 500 yards wide. Off the southwest part rocks extend for 250 yards, and the three-fathom line is 600 yards distant. Along the sand beach the three-fathom line is within 200 yards of the shore, the depth increasing to seven fathoms

then decreasing to five in the middle of the bay, and again increasing to ten on the outer line of the bay. Much kelp abounds in this harbor, even in deep water, the lower and thinnest portion being used by the Indians for fishing-lines. When coiled away and dry they break like grass, but soaking them in salt water renews their elasticity and strength.

The best anchorage is in the south part of the bay, in about five fathoms, being then off the small stream which comes in at the eastern foot of the hills. No direction can be given about anchoring off any particular village, as the Indians change their location so frequently; but near this stream will generally be found some houses, with an abundance of fresh water. During southerly weather little swell is felt here, and the wind can do no harm; but when a large westerly swell is coming up the strait it reaches here, and a vessel rolls uncomfortably unless she rides head to it.

The low ground abreast of the anchorage, and but two or three hundred yards from the beach, is the head of a small stream that runs through the low prairie lands behind Cape Flattery, and empties into Nisco bay south of the cape, near a winter village of the Mukkaws, called Wa-atch. This stream is frequently used by them in winter, when they cannot take their canoes outside the cape.

The primary astronomical station of the Coast Survey was just back of the beach, about 400 yards east of the small stream before referred to. From the NW. end of Waaddah island it bears S. by W. ½ W., distant 1⅜ mile. Its geographical position is:

	°	′	″	
Latitude	48	21	48.8	north.
Longitude	124	37	12.0	west.
	h.	*m.*	*s.*	
Or, in time	8	18	28.8.	

Magnetic variation 21° 30′ east, in August, 1852, with a yearly increase of 1′.

Soon after occupying this station the Indians dug up and destroyed all the marks fixed to recover it, under the belief that evil spirits were buried with them.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is XII*h.* XXXIII*m.* The mean rise and fall of tides is 5.6 feet; of spring tides, 7.4 feet; and of neap tides 4.8 feet. The mean duration of the flood is 6*h.* 20*m.*, and of the ebb 6*h.* 06*m.* The average difference between the corrected establishments of the a. m. and p. m. tides of the same day is 1*h.* 18*m.* for high water, and 1*h.* 02*m.* for low water. The differences when the moon's declination is greatest are 2*h.* 20*m.* and 1*h.* 56*m.*, respectively. The average difference in height of those two tides is 1.7 foot for the high waters, and 3.5 feet for the low waters. When the moon's declination is greatest those differences are 2.8 feet and 5.0 feet, respectively. The average difference of the higher high and lower low waters of the same day is 8.2 feet, and when the moon's declination is greatest, 9.5 feet. The higher high water in the twenty-four hours occurs about 11*h.* 54*m.* after the moon's upper transit, (southing,) when the moon's declination is north, and about 32*m.* before, when south. The lower low water occurs about 7*h.* after the higher high water. The greatest observed difference between two low waters of one day was 6.0 feet, and the greatest difference between the higher high and lower low waters of one day was 12.0 feet.

To find the times of high and low waters, first compute them for Astoria, and from the numbers thus obtained subtract 9 minutes for Neé-ah bay.

This bay was known as Poverty cove by the early fur traders on the coast; next as Port Nuñez Guona, by Quimper, in 1790. In 1792 the Spaniards, then establishing themselves at Nootka sound, attempted to found a colony here, and as late as 1847 bricks were found near the small stream abreast of the anchorage. We searched for vestiges of the settlement so late as 1852, but found nothing. In 1860 a brick was dug up from the depth of two feet, on the site pointed out by the Indians. Vancouver noted the indentation of the coast here in 1792. It was next called "Scarborough harbor," by the United States Exploring Expedition in 1841. The Indian name is that now adopted, and the only one by which it is known on the coast.

In 1852, the Mukkaws about Flattery could muster 300 or 400 warriors, mostly armed with muskets and knives. They had several large stockaded villages and hundreds of canoes. We have counted over 70 at one time fishing for salmon in the bay. They were brave and fearless; made voyages to Nitinat, Clayoquot, and Nootka sounds, and pursued the whale and black fish successfully. In three months they sold over 7,500 gallons of oil to the traders. They maintain trade with the Indians on the west of Vancouver, forcing them to dispose of their oil and skins to themselves directly, and not to the traders. By this means they make a large profit as intermediate traders. They estimate their wealth by the number of

slaves and blankets, and the quantity of oil, they possess. In the fall of 1852 the small-pox was introduced among them, and nearly swept off the tribe, more than two-thirds falling victims to the disease—among them the principal chief, Clisseet', and the second chief, Flattery Jack.

Two miles east of Waaddah island, and within the limits of the kelp, is a rock 150 feet high, called Sail rock by the United States Exploring Expedition, and by Kellet, Klaholoh, (seals.) The Indian name is Saelok. Behind it enters a small stream called the Okho on the Admiralty charts, but this is not the Indian name.

CALLAM BAY.°

From the eastern point of Neé-ah bay to *Sekou Point,** the western part of Callam bay, the course is E. ½ S., and distance 13½ miles. The shore-line is nearly straight, bluff, and bordered by rocks, with an occasional stretch of sandy beach. One mile off shore the average depth of water is 20 fathoms. The bay is at the western termination of a high, bold, wooded ridge, running parallel to the shore, with an almost perpendicular water face, and falling away rapidly inshore. This easily recognized ridge is about 1,000 feet high and seven miles long. The western extremity lies E. ⅓ S. from Waaddah island, is distant 16 miles, and called *Slip Point;** the eastern is designated *Pillar Point.** The width of the bay from Sekou Point to Slip Point is two miles, and the bearing E. by N. ½ N. Outside these limits 15 fathoms water may be struck. The form of the bay is nearly semicircular, and the depth of the curve nearly a mile, with six fathoms about the middle. Into it empties a small stream from the southeast, having low land on its eastern side, and a small rise on the west. Some sunken rocks are said to lie off Slip Point.

The water along the face of the ridge is very deep, and the bottom rocky and irregular. About half way along it is the entrance to a vein of lignite, which has been worked, but it is not fit for steamship consumption. Off this mine, at a distance of a cable's length, a depth of 35 fathoms is found, with a swell upon the rocks sufficient to destroy any boat loading there. The so-called coal is very easily broken, and crumbles by exposure to the weather. We saw it fairly tried upon a steamer, and it did not answer. An analysis of some of the best specimens yielded 68 per cent. of carbon, and we judge it to be bitumen. The geological formation of the whole region is opposed to the existence of coal. Among the bituminous shales we searched in vain for any specimens of fossil impressions.

Pillar Point is nearly E. ½ S. from the north end of Waaddah island, and distant 23 miles. Its latitude is 48° 13′ N. The peak is slightly separated from the main ridge by a depression. From this point the shore trends S.SE. about a mile, and receives a stream coming from the westward, called *Cancl river.** An Indian village exists here. The Indian name of the stream is Pisht-st.

From Pillar Point the next prominent object is a wooded hill called *Striped Peak,** bearing E. by N. and distant 17 miles. The shore retreats to the southward of this line about three miles, having alternate bluff and low shores, with many little streams opening upon them, and at the distance of 11 or 12 miles from Pillar Point, *Low Point** makes out at the mouth of a stream called the Lyre.† Rocks abound close along the shore. The kelp generally extends out to five fathoms, and the average depth of water, a mile off, is 10 fathoms. One mile before reaching the western part of Striped Peak is a sunken rock, upon which the sea breaks at low water. A slight indentation of the shore here has received the name of *Crescent bay.**

Striped Peak is several hundred feet high, and wooded, and was doubtless named from a well-marked line upon its water side, occasioned by a land slide from its summit. This mark is being rapidly obliterated by the growth of vegetation. The base of the hill towards the water presents a straight line, running E. by N. for three miles, with deep water off it.

*Freshwater bay.**—The eastern part of Striped Peak, with several rocks off it, is called Observatory Point on the Admiralty charts, and forms the western boundary of Freshwater bay. The eastern side is the low delta called Angelos Point, at the mouth of the river Elwha, and the line joining the two runs E. by N. ⅔ N. three miles across. Inside of this line the depth of the curve is about 1¼ mile, with water ranging from 16 fathoms to four or five close inshore. The western shore of the bay is bluff, the eastern low, with bluff in the rear. The waters of the Elwha bring down such quantities of earth that we find only 10 fathoms water at a distance of three-quarters of a mile off its mouth.

° English Admiralty chart, 1847.
† English Admiralty chart, 1847. The Indian name of this river is Kwa-ha-mish.

PORT ANGELES, OR FALSE DUNGENESS.

Four miles east of the Elwha commences a long, low, very narrow sand spit, stretching out from the bluff in a general E.NE. direction for three miles, to the point called *Ediz Hook*,* which lies 1½ mile off the main shore, thus forming an excellent and extensive harbor, with deep water of 25 to 30 fathoms, sandy bottom, close under the inside of the sand spit, almost to the head of the bay. Through the centre of the bay we found a line of 15 fathoms, sticky bottom, and between that and the main it shoals very regularly with the same kind of bottom. On the outside of the spit very deep water is found close to it, and the Hook may be rounded within a cable's length in 25 fathoms. In the indentation between Angelos Point and the head of the bay the water is shoal, 10 fathoms being found two miles from shore.

The Hook is covered with coarse grass, and in many places with driftwood, showing that the sea sometimes washes over it. Although it lies well out of the line of vessels bound either in or out of the strait, it would be advisable to mark it with large, easily-recognized beacons, or to plant trees along part of it, as it cannot now be distinguished, even in good weather, until a vessel is close upon it. From the middle of the strait it cannot be made out unless the appearance of the bluff beyond is known. At the head of the bay is a large salt-water lagoon. Fresh water is found on the south shore in several places, but the extensive flats render it hard to obtain. The bluff, 70 feet high, comes directly to the high-water line, and is covered with trees. Three Indian villages of the Clallums† existed on its shores in 1852, when a secondary astronomical station of the Coast Survey was established near the Indian graveyard at the head of the harbor. Its geographical position is:

	° ′ ″	
Latitude	48 07 52.0	north.
Longitude	123 27 21	west.
	h. m. s.	
Or, in time	8 13 49.4.	

From this station the extremity of Ediz Hook bears NE. by E., distant 2⅝ miles.

The bay was first discovered by the Spaniards, and by them made known to Vancouver in 1792. We first heard of the name, False Dungeness, in 1852, when at Cape Flattery, from traders there. The United States custom-house for this district was located here in 1862. On the 16th of December, 1863, the village and custom-house were destroyed by a torrent of water bursting from a gorge behind the town, where an accumulation of fallen timber had dammed up the waters. A preliminary chart of False Dungeness was published by the Coast Survey in 1853, and a second edition in 1856.

Coal of fair quality is reported to have been found within three miles of the harbor.

NEW DUNGENESS BAY.

The shore from Point Angelos gradually curves to the northeast, and about eight or nine miles from Ediz Hook another long, low, narrow sand spit, covered with grass, leaves the bluff shore and stretches in a general N.NE. direction for 3⅞ miles, forming the northwestern shore of the roadstead of New Dungeness. On the inside, one mile from the eastern extremity, another narrow sand spit makes 1⅛ mile southward towards the main shore, forming a large inner shoal bay, with a narrow opening, through which the water passes, as over a rapid at low tide. Abreast of this point is a small stream, affording an abundance of fresh water but boats must obtain their supply at low tide, and come out when the tide has sufficiently risen. The western side of this stream is a bluff 60 feet high, and upon it is a large village of the Clallums. The eastern shore of the stream is low, swampy, and covered with trees and brush. It forms the southern or main shore of the roadstead, and off it lie extensive mud flats, which are bare at low water for five-eighths of a mile, and run as far as Washington, or Budd's harbor. Shoal water exists some distance outside of these flats. About 20 fathoms are found a quarter of a mile south of the Light-house Point, the depth regularly decreasing across the bay, with a soft, tenacious, muddy bottom. The usual and best anchorage is to bring the light-house to bear about N. by E. ½ E., half a mile distant, when 10 fathoms are found one-

* English Admiralty chart of 1847; E-ediz on that of 1859.

† The tribes now generally but erroneously known by this name call themselves the Nūs-klai-yum; they occupy the American side of the strait from the O'ke-ho, 13 miles from Neé-ah bay. Their congeners are the T'sōk and Sūgh-us on part of the Vancouver side.

third of a mile, broad off the beach. With the light-house bearing NW. by N. three-quarters of a mile distant, the same depth and bottom are found. The nearest shore will bear south 1¼ mile, and the mud flat three-quarters of a mile in the same direction. A southeast wind drawing out of the strait blows directly into this harbor, but the bottom will hold any vessel with good ground tackle. The only difficulty will be to get the anchors out of the mud after riding a couple of days to a gale. In the last position a vessel can readily get under way and clear the point.

This point is so low that vessels bound in or out, before the erection of the light-house, were upon it before they were aware of their danger. Several had run ashore on the outside beach, and in 1855, while we were anchored close in, with the weather thick and hazy, a vessel from Admiralty inlet had been set out of her course by the currents, and came driving in with studding-sails out, and only saw her mistake and danger when the black hull of our vessel attracted her attention.

A shoal with 2½ fathoms makes out from the end of the point for half a mile, and a heavy tide-rip runs over it at the change of the currents.

A hydrographic sketch of New Dungeness was issued from the Coast Survey office in 1856.

LIGHT-HOUSE AT NEW DUNGENESS.

The structure is about one-sixth of a mile from the outer end of the point, and consists of a keeper's dwelling of stone, with a tower of brick; the upper half being a dark lead color, the lower half white. The tower is surmounted by an iron lantern painted red; the entire height being 92 feet, and its elevation above the mean sea-level 100 feet.

The light was first exhibited December 14, 1857, and shows every night, from sunset to sunrise, a *fixed white light* of the third order of Fresnel. It should be seen from a height of—

10 feet at a distance of 15 miles.
20 feet at a distance of 16½ miles.
30 feet at a distance of 17¾ miles.

Its geographical position, as determined by the Coast Survey, is:

	°	′	″	
Latitude	48	10	58.9	north.
Longitude	123	06	07	west.
	h.	*m.*	*s.*	
Or, in time	8	12	24.5.	

Magnetic variation, 21° 43′ east, in August, 1856, with a yearly increase of 1′.

From it we have the following bearings and distances:

Striped Peak, SW. by W. ½ W., distant 21 miles.
Race Rocks light-house west, distant 18 miles.
Esquimalt Harbor light-house, N. 66° W. 20 miles.
Victoria harbor, NW. by W. ¾ W., distant 17¾ miles.
Smith's Island light-house, N. 31° E., distant 13½ miles.
Point Wilson, E. by N., distant 14¾ miles.
Admiralty Head light-house, S. 73° W., 17⅝ miles.

Fog-bell at New Dungeness.—Upon the outer extremity of the point a fog-bell of 1,100 pounds weight has been placed, and is sounded every ten seconds during foggy or other thick weather day and night. "The striking machinery is in a frame building, with the front open to receive the bell, painted black, raised 30 feet above the ground on an open structure, whitewashed."

Tides.—The approximate corrected establishment is III*h.* III*m.*, and the approximate mean rise and fall of tides 5.0 feet.

Our experience in these waters suggests that the light-house building should be painted black, or a color most readily made out in foggy or smoky weather. Several years since we urged the advantage of planting trees along the spit to afford large dark masses, that a lookout might see the danger before being upon it. A few settlers are now located about the bay.

This harbor was first examined and made known by Vancouver, who applied the present name in 1792. It is known by no other.

Eastward of Dungeness the shore is indented by Washington harbor, Port Discovery, and Admiralty inlet, the northwest point of the entrance to which is Point Wilson.

WASHINGTON, OR BUDD'S HARBOR.

From New Dungeness roadstead to the entrance to this harbor the immediate shore is low, flat, covered with trees, and bordered by an extensive mud flat; but behind it, at a very short distance, rises a level plateau. The bluff at the NE. point of the harbor is seen from Dungeness Point. The entrance to the harbor is nearly closed by a low sand spit stretching across it from the east, almost to the western part, where a narrow channel way exists having two fathoms through it. This cannot be seen from Dungeness Point, which is 6½ miles NW., on account of the outward curving of the intermediate shore. Inside of the harbor we found 17 fathoms. Its width is a little over a mile, and regular, its length about three miles, and the general direction SE. by S. One mile outside of the sand spit a depth of 10 and 12 fathoms exists, deepening rapidly to 30 and 35, with a bottom of stiff mud.

This harbor was surveyed first by the United States Exploring Expedition, and called Budd's harbor; but there being a sheet of water in Puget's sound bearing a similar name, we have adopted Kellett's appellation. The Indian name of the bay is S'quim, by which it is generally known to the settlers.

Quimper in 1790 explored the harbors in this vicinity, as did Galiano and Valdes in 1791.

PROTECTION ISLAND

The western extremity of this island lies E. ⅔ S., distant 7½ miles from Dungeness light-house, and extends 1¾ mile NE. ½ E., being narrow, curved outward to the strait, and having a low point at each end, with shoal water stretching from the western. Its sides are very steep, and about 200 feet high, the seaward part covered with timber, and that towards Port Discovery undulating and covered with fern. It lies two miles directly off (NW.) the entrance to Port Discovery. On the inside is found very deep water, but upon the outside a line of kelp, about half a mile out, marks the four-fathom curve, and from this a bank runs out N.NW. for three miles, having from five to fifteen fathoms upon it, with a shoal spot of three and four fathoms two miles from the island. It affords a good anchorage, with light airs and strong adverse currents. The bottom is irregular and falls off suddenly. This shoal has been named the Dallas bank by the United States Coast Survey.

This island, with Port Angeles and New Dungeness, afford the first examples of the peculiar feature of low, sandy, and gravelly points covered with coarse grass and bushes, making out from the high cliffs, where the tendency of strong currents would seem to be to cut them off.

It was called Protection island by Vancouver in 1792, and on account of its position in relation to Port Discovery is very aptly named.

PORT DISCOVERY.

From Dungeness light the west side of the entrance to Port Discovery, called Challam Point, bears E. by S. ½ S., distant nine miles. From Washington harbor the distance is four miles. The intermediate shore is composed of high steep cliffs. Cape George, the eastern point of the entrance, bears NE. ¼ E. 1½ mile from Challam Point, and is a steep bluff, rising directly from the water. The average width of the bay is nearly 1¾ mile for nine miles of its length, and then decreases rapidly to the Salmon river. It makes four general courses from the entrance to the head, as follows: 1¾ mile south, four miles E. by S. ⅔ S., 2½ miles S. by E., and 1¾ mile SW. by S. The shores are abrupt, and covered with wood to their edges, and the projecting parts are all terminated by low points stretching out short distances. On the second point, on the eastern side, were (1856) the remains of an extensive stockaded village of the Clallums. Mount Chatham* lies off the southwestern part of the bay, and reaches a height of 2,100 feet.

When well in this bay Protection island so completely shuts up the entrance as to make it appear as a large lake. The great drawback to this port is the depth of water, which in mid-channel is not less in any place than 25 fathoms, and in some is 40. Under the second low point on the east we could not find less than 25 fathoms a few ship's lengths from the beach, but found good anchorage in 20 fathoms, soft bottom, on the western shore, two miles S.SE. from Challam Point, and abreast of a low swampy beach. At the head of the bay it contracts in width, the water shoals, a large mud flat exists for the last mile, and the shores become higher, but in places the hills retreat, and give a scanty space for a few settlers' cabins. For a few years after the settling of San Francisco many vessels came here for piles and spars; but a saw-mill has been built here.

*Named by the United States Coast Survey in 1855.

It was discovered in 1790 by Quimper, and called Port Quadra. In 1791 the Spanish discovery brig Sutil, Señor Don D. Galiano, and the schooner Mexicano, Señor Don C. Valdez, refitted their ships here.

It was first surveyed and made known by Vancouver in 1792, who refitted his ships and established an observatory at the second low point on the western shore. He gave it the present name, after one of his ships, and it is known by no other.

In 1855 we found on the bluff back of Challam Point great numbers of trees that had been twisted off and uprooted by a tornado from the southeastward. The prostrated trees were plainly visible on the sloping hillside from the bay.

Point Wilson is the western point of the entrance to Admiralty inlet. From Dungeness light it bears E. by N., distant nearly 15 miles, this course passing over the outer edge of the three-fathom shoal (Dallas bank) off Protection island. The extremity of the point is composed of low sandy hillocks, covered with coarse grass; but west of it the hill rises 200 or 300 feet, and again falls inshore. This appearance is well seen in approaching it from the strait, and is a good mark. Between the point and Port Discovery the shore is high, with steep yellow cliffs, and about midway a slightly projecting angle is formed, called Middle Point. To the northwest of the point 15 fathoms can be obtained a mile from the shore, but the water shoals suddenly, and in running in a fog the lead must be kept going. Off the eastern end of the point 20 fathoms can be got a ship's length from shore. During ebb tides a very strong eddy current sets to the eastward along shore between Discovery and Point Wilson. In 1855, when coming out of the inlet on the large ebb, with scarcely any wind, we kept outside of the rip showing the line of the eddy. A vessel two or three miles ahead was in the eddy at the same time. We were carried past Protection island, but she was drifted back to Point Wilson. The Indians when bound to Dungeness keep well out in the ebb.

A light-house was recommended for this point, as it presents many advantages over the head on the opposite side of the inlet.

When we were last there (1857) a small unfinished log hut, called Fort Mason, stood upon it.

It received its present name from Vancouver in 1792.

QUIMPER PENINSULA.

Between Port Discovery and Port Townshend lies a peninsula three miles in breadth and ten miles in length, offering great advantages as a location for a town. No name has hitherto been applied to it, and we have ventured to designate it as above.

For the description of Admiralty inlet, Puget's sound, and adjacent waters, see pages 136 and 145.

VANCOUVER ISLAND,

Originally called Quadra and Vancouver by the Spanish commander and Vancouver, who met in the Gulf of Georgia in 1792, the former entering from the north, and the latter from the south, through the Strait of Juan de Fuca. The name Quadra has fallen into disuse.

NORTH SHORE OF THE STRAIT OF JUAN DE FUCA.

From Point Bonilla to Owen Point, forming the western head of the entrance to Port San Juan, the shore runs 13 miles E. $\frac{1}{8}$ N. It is nearly straight, rocky, and bluff, with high mountains rising immediately behind it, and all heavily wooded. From 10 to 20 fathoms are found within half a mile from the shore. Vessels are apt to lose much of the wind when close under either shore, and at present it is impossible to say where the strongest currents run.

PORT SAN JUAN.

The eastern head of the entrance is formed by several large rocks, called Observatory rocks on the Admiralty chart of 1847. From Tatoosh Island light they bear NE. by N. $\frac{1}{4}$ N., 14 miles distant. The width of the bay is $1\frac{3}{8}$ mile from point to point, and their bearing E. $\frac{1}{4}$ S. and W. $\frac{1}{4}$ N. from each other. The length of the bay is $3\frac{1}{2}$ miles on a general course NE. $\frac{3}{4}$ N., and the width almost uniform at $1\frac{1}{4}$ mile to the very head, where several streams enter, amongst which are Cooper inlet at the northeast, and the river Gordon at the north, where stands a large Indian village called Onismah.* Across the entrance a depth of ten fathoms is found, except near Observatory rocks,* where 17 exists close to them. Outside we find from 15 to 20, and

* English Admiralty Chart, 1847.

inside the bottom is very regular in seven to ten fathoms, up to the head, where it decreases evenly to four within half a mile of the shore. The eastern side has the least number of rocks, and a mid-channel course clears everything well. In heavy southerly weather a swell rolls straight in, but by anchoring well up on either side vessels avoid it. The sides are steep, high, and backed by heavily timbered hills and mountains. At a distance in very clear weather it is difficult to distinguish the entrance unless one is acquainted with the locality, but in moderately hazy weather the indentation is readily made out.

The approximate geographical position of Observatory rocks is:

	°	′	″	
Latitude	48	31	30	north.
Longitude	124	28	15	west.

Meares first noted this bay in his map, and called the western point Point Hawksbury. He called Bonilla Point Point Duffire, after his first officer. It was afterwards examined by the Spaniards, and Vancouver stretched over to this shore and plotted it on his chart. It was surveyed by the United States Exploring Expedition in 1841, and by Kellet in 1847.

From Observatory rocks the shore preserves the same features, running east in a straight line to *Sheringham Point** 23½ miles, with soundings in from six to twenty fathoms a mile from shore, and in some places ten fathoms at least two miles off, then suddenly dropping into 50 and 60 fathoms. From Sheringham on an E. ½ N. course to *Otter Point** the distance is 4½ miles, with a curve in the shore of one mile, but the shore is generally so uniform in its character that it is hard to recognize these points in sailing close abreast of them.

SOOKE INLET.

From Sheringham Point to *Beechy Head** the distance is 11½ miles, and the course E. ¼ N. The shore is varied by an indentation one mile deep, called Sooke bay, and at a distance of four miles from Otter Point is broken by a very narrow crooked entrance, which is Sooke inlet. This leads to a large sheet of water three miles inland, called Sooke basin. One mile east of this inlet is a large islet called Secretary island,* and on the western side is a bright yellow bluff, from which makes out a low sand spit NE. for half a mile across the entrance. To the eastward of this spit is the passage, only 100 or 200 yards wide, with an irregular and rocky bottom, and some sunken rocks. The currents run through with great velocity, and a thorough knowledge of these and the channel is necessary to enter this place. When a depth of ten fathoms is struck off the entrance a high hill called Mount Maguire* will bear about NE. It is partially covered with trees, but the bare rock shows distinctly in many places, and this feature now commences to distinguish the southeast part of Vancouver island. The shore in many places is bare and rocky, with patches of land covered with fern and destitute of trees, and the houses of settlers begin to appear.

Off Beechy Head the water is very deep, and the currents go by with a rush. In this vicinity we recollect the instance of a United States revenue cutter striking the bold shore with her flying jib-boom, and only striking her forefoot after the jib-boom had been carried away.

The approximate geographical position of Beechy Head is:

	°	′	″	
Latitude	48	18	30	north.
Longitude	123	39	27	west.

The pronunciation of Sooke is exactly like that of the English word "soak." The Indian word is T′sōk.

*Beecher bay** lies to the eastward of Beechy Head. Its general direction is north for about a mile and a half, width about the same, and the bottom is rocky and irregular, with deep water. Many rocky islets are found upon the eastern side of the bay, and two large ones at the northern part. The channel runs between these with about 20 fathoms, and with from seven to ten fathoms beyond the eastern one. The eastern head is formed by *Cape Church.** This bay is enclosed by high rocky hills.

RACE ROCKS.

From Beechy Head the outermost of these rocky islets bears E. by N., distant five miles, and its distance from Bentinck island,* close under the main shore, is one mile. This cluster of islets numbers about ten principal ones, which cover an area of not less than half a mile square. They are low, and the larger ones are

* English Admiralty chart, 1847.

covered with grass, but are without trees or bushes. Stretching SE. from them for half a mile the bottom is irregular, with points of rock in five fathoms. The currents rush by with great velocity and irregularity, attaining a rate of six miles per hour, as we have measured by the log. This is a hard place for sailing vessels when the airs are light. See remarks in the directions for Esquimalt and Victoria harbors from the Race rocks.

LIGHT-HOUSE ON RACE ROCKS.

The light-house on the Great Race has an elevation of 118 feet above high water.

The light is a *white light, showing a bright flash* every ten seconds. The illuminating apparatus is of the second order of Fresnel, and was first exhibited January 1, 1861. Under a favorable state of the atmosphere it should be seen from a height of—

10 feet at a distance of 16.1 miles.
20 feet at a distance of 17.6 miles.
30 feet at a distance of 18.8 miles.

The approximate geographical position of the light is:

	° ′ ″
Latitude	48 17 30 north.
Longitude	123 32 15 west.
	h. m. s.
Or, in time	8 14 09.

Computed magnetic variation 22° 04′ east in 1861.

Notice has been published by order of the governor of Vancouver island that after the first day of October, 1864, the tower of the light-house on the Race rocks will be painted in alternate broad horizontal bands of black and white.

From Race rocks the strait opens to the northward, and we have the following bearings and distances to several important positions:

Esquimalt Harbor light, north 8½ miles.
Entrance of Victoria harbor, N. by E. ½ E. 9 miles.
Trial islands, NE. by N. 10½ miles.
Discovery island, NE. by N. 15 miles.
Smith's Island light, N. 65° E. 26½ miles.
New Dungeness light, east 18 miles.

From Race rocks the shore is very much broken to Esquimalt harbor, first by a narrow deep indentation called Pedder bay,* its northern point called William Head;* then Parry bay* and Albert Head,* and just before reaching Esquimalt a long, low spit, with a salt lagoon behind it. Along this shore the ebb current runs with great strength, the water being from 40 to 50 fathoms deep, and the general set on the Race islands.

DIRECTIONS FOR ESQUIMALT AND VICTORIA HARBORS FROM THE RACE ROCKS.

The Race Rocks tower can be distinctly seen at a distance of 12 miles. On nearing it vessels should round it at a distance of not less than half a mile to a mile. The outermost danger is a rocky patch of five feet, lying SE. by E., nearly half a mile from the tower.

On rounding the rocks Esquimalt Harbor fixed light will be seen, and should be steered for on a bearing N. ½ W., which will lead clear of the reef extending a short distance off Albert Head. Keep the bright light in full view. If a vessel gets too far to the westward it will appear dim, and shortly become shaded *green*, when she should immediately steer to the eastward until it again shows bright. This precaution is necessary on account of the currents, which during spring tides run as much as six knots in the neighborhood of the Race rocks. The ebb runs almost in a direct line from the Canal de Haro to the rocks, and sets between them and the shore. There are also tide rips in the vicinity dangerous to boats and small craft.

When to the northward of Albert Head, and wishing to anchor in Royal bay, a vessel should bring Esquimalt light to bear N. by W., when she will have 10 fathoms good withholding ground about one mile from the light, or, if desired, she may stand to the westward until the light becomes shaded green, when she should *immediately* anchor.

* English Admiralty chart, 1847.

In entering Esquimalt harbor the light should be left from three to four hundred yards on the port hand, and when it bears S. by W. a ship may anchor in seven fathoms, or stand into Constance cove, (Village bay.) When the light bears NW. by W. it changes from bright to *red*, and shows the latter color in the harbor.

In entering Esquimalt from the eastward the light should not be steered for until it shows bright, which is the mark for clearing Brotchy ledge off Victoria, and Scrogy rocks off Esquimalt. When the light changes from red to bright it leads clear of the Scrogy rocks about 120 yards.

The course for the entrance to Victoria harbor, after rounding the Race light, is N. ¾ E., and when Esquimalt light changes from bright to red a vessel will be one mile from the shore in 33 fathoms.

Ships, however, above the size of coasters, unless acquainted with the neighborhood, are recommended not to run for Victoria at night, when they cannot enter, but rather to anchor in Royal bay for daylight. With southeasters and stormy weather a ship should invariably run into Esquimalt harbor, which she can readily do with the assistance of the light on Fisgard island.

ESQUIMALT HARBOR.

This is the bay where all the British men-of-war lie. It is in the deepest part of the large indentation called Royal bay.* The entrance is a quarter of a mile wide, and has two rocky heads on either hand, the western having Fisgard† island off it, and the eastern outlying sunken rocks south of it, with several islets. From the entrance the general direction of the bay is N.NW., and the extreme length two miles. After passing the heads the harbor opens to the east, forming a small beautiful bay, called Village bay, or Constance cove, where men-of-war anchor in a uniform depth of six fathoms. In the entrance are seven and eight fathoms, and the approaches for a mile give from 10 to 13 fathoms.

At the head of the harbor is Mount Seymour.*

Five miles west of the head of Esquimalt bay is the head of a large bay coming from the north, and opening into the inside channel to the Nahny'moh coal mines.

LIGHT-HOUSE AT ESQUIMALT HARBOR.

The building is erected on Fisgard island, on the western side of the entrance to Esquimalt harbor. It consists of a keeper's dwelling of brick, with a tower 57 feet in height, whitewashed, and surmounted by a lantern painted red.

The illuminating apparatus is of the fourth order of the system of Fresnel, and shows a *fixed light*, visible through an arc of 220° of the horizon. Through 20° it exhibits a green light, through 58° a bright or white light, and through 142° a red light. It will show *green* when bearing between N. by E. ⅔ E. and N. ¼ W., *white* from N. ¼ W. to NW. by W. ⅓ W., and *red* towards the harbor, or from NW. by W. ⅓ W. to S.SE.

It is placed at an elevation of 70 feet above the level of the sea at high water, and in favorable states of the atmosphere should be visible from a height of—

10 feet at a distance of 13.2 miles.

20 feet at a distance of 14.7 miles.

The approximate geographical position of the light is:

	° ′ ″
Latitude	48 25 38 north.
Longitude	123 27 10 west.
	h. m. s.
Or, in time	8 13 48.7.

Computed magnetic variation 22° 05′ east in 1861.

The light was first exhibited November 19, 1860.

VICTORIA HARBOR.

The entrance to this harbor is 2¼ miles east of Esquimalt. As the channel is very contracted, crooked, and obstructed with a 10-feet bar, vessels usually anchor outside in 10 or 15 fathoms, taking care to avoid *Brotchy ledge*,* with only seven feet of water upon it, lying about half a mile S.SE. of the eastern head, and SW. ¾ W. from Mount Beacon,* upon which was a range, with one on the shore. We believe, however, that the ledge has been marked by a spar buoy since our visit there. The channel inside is well marked out by

* English Admiralty chart, 1847.
† English charts of 1851 call it Fishguard.

buoys, but a pilot is necessary to carry a vessel in. The whole length of the harbor is about three or four miles, with an average width of one-fifth of a mile. It is very tortuous, and the head stretches west nearly to the head of Esquimalt bay, where a portage exists.

The approaches to the harbor are deep outside of Brotchy ledge, and from 10 to 20 fathoms are found inside of it.

The approximate geographical position of Mount Beacon is:

	° ′
Latitude	48 24½ north.
Longitude	123 22¼ west.

The Hudson Bay Company has a flourishing settlement and trading establishment a mile and a half within the entrance, and much of the surrounding country is well cultivated, but the settlement hereabout must spread toward Esquimalt, or upon that harbor, not only on account of its superior excellence, but because fresh water is scarce about Victoria. A steamer runs regularly between Victoria and Portland, (1864.)

The shores are comparatively low, but rocky, and covered in part by trees, reminding one of the rocky parts of the coast of Massachusetts and Maine.

TRIAL ISLANDS.

These islands lie four miles E.SE. from the entrance of Victoria harbor, with a rocky, irregular, and moderately low shore. The islands are small in extent, and the currents set by them with great velocity.

DISCOVERY AND CHATHAM ISLANDS.

The former of these two islands lies 2½ miles off the southeast point of Vancouver island. It is about a mile in extent, 230 feet high, partially covered with trees, and consists of granite rock, which shows in places without a particle of vegetation.

Northwest of it, and separated by a narrow and intricate channel full of rocks, lies Chatham island (composed of several small islets,) somewhat smaller in extent, and not so high as Discovery island, but similar in appearance and formation. Between these two islands and Vancouver lies an extensive bay nearly filled with rocks and reefs, the main body being called the Chain islands. Close around the western side of Discovery and Chatham is a channel, having from 7 to 17 fathoms, but it is only fit for small craft. From the western part of Chatham to Cadboro' Point the distance is about three-quarters of a mile. Numerous rocks show close to the point.

The approximate geographical position of the middle of Discovery island is:

	° ′
Latitude	48 26 north.
Longitude	123 14½ west.

A light-house is much needed upon Discovery island, as marking the southwest point of the southern entrance to the Canal de Haro.

The islands were named by Kellett after Vancouver's two ships.

ARCHIPELAGO DE HARO.

This extensive group of islands was first seen by Lopez Gonzales de Haro, in 1789; next by Quimper, in 1790; and first circumnavigated by Don Francisco Eliza, in 1791. Vancouver, in 1792, passed through the Rosario strait from the south, and gives a good representation of the channel and islands, his boats evidently working among them. Galiano and Valdes, in 1792, about a month later than Vancouver, passed through one of the straits from the north, and represented the mass of islands as one which they designated Isla de San Juan. The agents and factors of the Hudson Bay Company, doubtless, knew most of the channels and islands subsequently; still, up to 1853, they exhibited only eye-sketches of the Canal de Haro, north and east of Sidney island. In 1841 the United States Exploring Expedition made the reconnaissance of the archipelago, but did not lay down the islands on the western side of the Canal de Haro. The Rosario strait was surveyed, and called Ringgold's channel. Most of the islands, channels, points, &c., were named after officers and vessels of the navy, and it is said to have been intended to call the whole group the Navy archipelago. The Canal de Haro is erroneously called the Canal de Arro.

The Canal de Haro and Rosario strait were surveyed by the United States Coast Survey in 1853 and 1854, and the archipelago called Washington sound.

CANAL DE HARO.

The southern entrance to this strait may be said to lie between Discovery island and the point of Bellevue or *San Juan island*,* nearly northwest and seven miles distant. Starting from this line and about three miles from Discovery, a course NW. by N. for 16 miles will run through the first stretch of the strait; thence an abrupt turn is made towards the eastward, and the way out can be readily seen between the islands. The next course is NE. ½ E. for 11 miles; finally, N.NW. 2½ miles, and a run of seven miles on that course will carry a vessel into the middle of the Gulf of Georgia.

Commencing at the starting point, we have Bellevue island on the eastward, and pass it at the distance of 1½ mile. Its mountains rise to 1,070 feet, and some of them are only partially covered with wood. The bluffs are very precipitous and inaccessible, and the depth of water close to them is as much as 150 fathoms. The greater extent of the strait is to the westward, stretching off into bays and passages among the islands. *Cordova bay*† is the only available anchorage about this entrance. It commences at Gordon Head, 5½ miles NW. by W. ¼ W. from Discovery island; then stretches westward for two miles, and gradually curves to the N.NW., with a long high bluff, broken and bright, at *Cowichin Head*.‡ Back of the southwest part of the bay rises a bold rocky-topped hill, (named *Mount Douglas*,†) which reaches a height of 690 feet. Fresh water is obtainable on the southern shores of the bay. The northern limit of the bay is *Darcy island*,† N. ¼ W. four miles from Gordon Head, and on this course and 1¾ mile from the head is *Zero rock*,† a small white rock, showing a few feet above water, with plenty of water around it, but foul bottom and a patch of kelp a few hundred yards N.NW. of it. A mile and a quarter west of it is a sunken rock. In the bay a depth of not over 20 fathoms is found, decreasing irregularly in advancing, but in the southern portion affording capital holding ground in 10 fathoms. A mile and a half E.SE. from Gordon Head are patches of kelp and foul bottom.

When 8½ miles within the entrance the width of the strait decreases to 3¼ miles, having Darcy island (low and wooded) on the west, with a small islet off its NE. face, and very large fields of kelp stretching far off the southeast point into the Canal. In one of these fields we discovered in 1854 a sharp-pointed rock, which has been named *Unit rock*,(1) lying S. 72° E. from the SE. point of Darcy island, and distant from it three-quarters of a mile. The small, sharp apex of this rock rises about three feet above the very lowest tides. In recent charts deep water is placed around it, and when the coast surveying brig Fauntleroy beat through the field the existence of this danger was unknown.

Since its discovery several rocks covering a space of half a mile square, and bearing S. 72° E. from the SE. point of Darcy island, have been found. They are marked by a field of kelp, and one point uncovers at the lowest tides. Near mid-channel a depth of 155 fathoms is found.

The island to the eastward, nearly abreast of Darcy, with a small cove at its southern end, is *Henry island*,(2) having a high, rocky precipitous front, and a swirling current around it. Further on and to the westward is the southeast end of *Sidney island*,(3) 1½ mile northward of Darcy, with the Dot rocks between them, but nearer Sidney. This island is not high like those on the other side of the channel, and a landing is easily made at any point. The channel here, 10 miles from the entrance, is 2¾ miles wide. To the eastward it opens beyond the north end of Henry island, with high mountainous islands bounding the view. To the westward lie a couple of long, narrow islands a mile from Sidney, and between them and the latter is good anchorage and capital fishing ground for halibut; that near the canal is named Halibut island.(1) The moderately low wooded islands, three or four miles ahead, and on the western side of the channel, have not been named. Between them runs the inside channel for steamers to the Nahnymoh coal mines. The background of the view is occupied by wooded islands, overlapping each other and appearing like a continuous shore. The large high island on the eastern side, 15 miles from the entrance, is *Stuart island*,(4) and the canal is here contracted to a breadth of only two miles, this being the narrowest part. Two and one-eighth

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* San Juan on English Admiralty charts of 1847 and –'59; Bellevue by the Hudson Bay Company; Rodgers by the U. S. Exploring Expedition, 1841.

† English Admiralty chart, 1847. On that of 1859 Cordova bay is called Cormorant bay.

‡ The name of the Indian tribe in this vicinity. Admiralty chart, 1847.

(1) Named by the U. S Coast Survey, 1854.

(2) Named by the U. S. Exploring Expedition, 1841.

(3) English Admiralty chart, 1847.

(4) Named on the English Admiralty chart, 1847.

miles S. 67° W. from the western point of Stuart island, the British surveying steamer Plumper found (1858) a rock covered at a quarter flood, and having irregular bottom around it for the space of half a mile square, with soundings from 5 to 20 fathoms. One mile NW. of Stuart's island a depth of 190 fathoms is found.

Stuart island in many places is very high and precipitous, and covered with timber, but in some parts sparsely. Near its southwest head a perpendicular wall of rock serves also to distinguish it. After passing the western end of this island at the distance of a mile, the channel takes an abrupt turn to the eastward, and the Gulf of Georgia is seen. The course now is NE. ½ E. for 11 miles, having on the northwest side *Saturna island,* which rises into mountains. *Java Head,*(1) near its eastern extremity, stands up perpendicularly nearly 700 feet, but the extreme part, called *East Point,** is a long sloping point, in many places destitute of trees. The small island lying off its north shore is Tumbo.*

On the east side the waters open well to the southeast, and the islands rise in high hills and mountains. The large island abreast of Java Head is *Waldron,** which has good anchorage off its southwest side, where the shore-line curves well in. The western point is low and sandy; the southern, called *Point Disney,** is perpendicular, high and rocky. Off its northern face lie two islets, called *Skipjack islands.*(2) The western one is about a mile from Waldron, moderately high, and wooded; the eastern is smaller, about 40 feet high, destitute of trees, but covered with grass, and lies a mile east of the former. Between these lies a sunken rock, and the current rushes by with great velocity.

On some recent maps two islands, called Adolphus and George, are laid down close to the Skipjacks, but in 1853 we examined the vicinity and satisfied ourselves that they did not then exist.

When East Point bears NW. by W. ¾. W two miles distant, the west end of *Patos island*(3) will bear N.NE 2½ miles, and the west end of the *Sucia group,*(4) E.NE. 3½ miles; the course out lying N.NW. between Patos and East Point, which are 2¾ miles apart. Seven miles on this course carries to the middle of the Gulf of Georgia. Close off East Point is found a depth of 120 fathoms, and off Patos island 170 fathoms. All these islands are moderately high and covered with wood. They are rugged and irregular, composed of sandstone and conglomerate, upheaved until the strata are nearly perpendicular in some places, and interspersed with small veins of lignite.

West's reef(5) lies S. 66° W., one mile from the SW. point of Sucia; it has less than two fathoms upon it, and is marked by a large mass of kelp.

The approximate geographical position of two or three points will serve to check the courses above given:

East point of Discovery island, latitude 48° 25′ N., longitude 123° 14′ W.

West point of Stuart island, latitude 48° 41′ 17″.5 N., longitude 123° 14′ 29″.6 W.

West point of Patos island, latitude 48° 47′ 03″ N., longitude 122° 57′ 31″.2 W.

The number of islands and the intricate channels lying between the two straits we shall not attempt to describe. A proper appreciation of them can only be obtained from the chart. The position of the islands are shown on sketches issued from the Coast Survey office in 1854 and 1858.

SMITH'S ISLAND.

Returning to the Strait of Fuca to enter the Rosario strait, we notice, first, *Smith's island,* lying at the eastern termination of the Strait of Juan de Fuca, within six miles of Whidbey island, and seven miles broad off the southern entrance to the Rosario strait. It is quite small, not occupying half a square mile, and rises regularly from the eastern to the western extremity, where it attains a height of about 55 feet, with an almost perpendicular cliff of clay and gravel. It sustained a few dreary looking trees, but none of great thickness or height, and the surface is covered with a growth of bushes ten or twelve feet high. There is no fresh water to be found on the island, and two or three feet below the surface is a stratum of hard, dry clay with pebbles.

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(1) Named by the U. S. Exploring Expedition in 1841. On the English Admiralty chart of 1859 it is called Monarch Head.

* Named by the U. S. Exploring Expedition 1841.

(2) So called by the U. S. Exploring Expedition, 1841. Named Wooded island and Bare island by U. S. Coast Survey in 1853.

(3) Old Spanish name. Called Gourd island by the U. S. Exploring Expedition, 1841.

(4) Old Spanish name. Sucia signifies muddy. The harbor on the east has a soft muddy bottom. The U. S. Exploring Expedition called them the Percival group, 1841. The Indian name is Choo-sá-nung.

(5) Discovered and named by the U. S. Coast Survey, 1858. Called Plumper reef on English Admiralty chart, 1859.

A very small, low islet called *Minor*,* exists one mile northeast of Smith's island, and at very low tides is connected with it by a narrow ridge of boulders and rocks. A field of kelp extends to the westward of Smith's island for 1½ mile, and has a width of a mile. In sailing through this field we found the depth of water very uniform at 6½ fathoms, and in no place did we get less. The bottom is hard and sandy, and no rocks have been discovered in it. Another smaller field is seen to the westward of the one just mentioned. Good anchorage is found on the north side of the island, east of the kelp, in from 10 to 5 fathoms, and on the south side, east of the kelp, in from 10 to 8 fathoms, hard bottom. We parted our cable here in a southeast gale, but the smooth sandy bottom enabled us afterwards to secure the anchor. Off the eastern end of the small islet very deep water is found close to it.

THE LIGHT-HOUSE ON SMITH'S ISLAND.

This structure consists of a keeper's dwelling, with a tower rising through it, and surmounted by an iron lantern painted red. Its height is 41½ feet above the surface of the ground, and about 90 feet above the mean level of the sea. The dwelling and tower are plastered and whitewashed, and situated on the highest part of the island, near the southwest point. All the trees have been cut down to afford a clear horizon in every direction. The illuminating apparatus is of the fourth order of Fresnel, shows a *revolving white light, with a flash every half minute*, and should be seen from a height of—

10 feet at a distance of 14½ miles.

20 feet at a distance of 16 miles.

30 feet at a distance of 17 miles.

It was first exhibited on the 18th of October, 1858, and shows from sunset to sunrise.

The approximate geographical position of the light, as determined by the Coast Survey, is:

	°	′	″	
Latitude	48	19	01.0	north.
Longitude	122	50	02	west.
	h.	*m.*	*s.*	
Or, in time	8	11	20.1.	

The light shows into the entrances of Canal de Haro, Rosario strait, and Admiralty inlet, and out into the Strait of Juan de Fuca.

The following bearings and distances will show the relative position of Smith's island:

From Discovery island it lies east 16½ miles.

From Race Island light NE. by E. ¾ E. 26½ miles.

From New Dungeness light NE. by N. 13⅔ miles.

From Point Wilson NW. ½ N. 11 miles.

From southwest point of the entrance to Rosario strait S. ½ E. 6⅔ miles.

This island was discovered by Eliza in 1791, and named Isla de Bonilla.

Vancouver gave it no name.

It was called Blunt's island by the United States Exploring Expedition in 1841.

Called Smith's island on the English Admiralty chart of 1847, and is generally known by it.

Fields of kelp.—Three miles S. ½ E. of Smith's island is a field of kelp over a mile long by a mile wide. Through it the soundings range from six to twelve fathoms, and the bank stretches off to the E.SE. for two miles, with ten and twelve fathoms upon it. This locality requires sounding out, as it would prove a great advantage for vessels drifting at the mercy of the currents to know of the existence of such anchoring grounds. The detailed hydrography of all this sheet of water eastward of the Race islands will develop many interesting features of bottom.

Bearing W. ½ S. from Smith's island, and eight miles distant, is another field of kelp nearly a mile in extent. We came unexpectedly upon it at night, in 1854, during a heavy blow, with rain. It was not then marked on any chart. Next morning we sounded through it, and found the depth of water very uniform at 5 fathoms.

Recent partial examinations show that this field marks the NE. portion of the bank lying nearly north and south, with a length of 4 miles, and a breadth of 1½ mile within the limits of the 20-fathom line.

We have named it the *Hein bank*.

* Named by the U. S. Coast Survey in 1854.

The field laid down on the Amiralty chart of 1847—nearly on this course, and four miles from Smith's island, having only 2 fathoms marked upon it—has been sought for, but not found.

One mile south of the southeastern point of Bellevue island, and 8½ miles NW. by W. ¼ W. from Smith's island, lies a small field of kelp about half a mile square, with three fathoms marked upon it; but we have been informed that the Hudson Bay Company's steamer Otter found as little as 6 feet of water within its limits. Recent examinations show that this is connected by a 4-fathom bank with the SE. end of San Juan island, and stretches S.SE. therefrom for 2½ miles, with a breadth of three-quarters of a mile within the limit of the 10-fathom line. It is named the *Salmon bank*.

All these fields and patches of kelp should be avoided, as they denote rocky bottom; and isolated points of rock frequently exist among them and escape even a very scrutinizing survey.

Shoals.—E. by N. 5½ miles from Discovery island, and S. by W. ⅓ W. 4½ miles from the Hudson Bay Company's settlement on Bellevue island, is an 11-fathom shoal a mile or two in extent; but the very few soundings upon it leave the precise extent and smallest depth of water doubtful, (1857.)

Recent partial examinations show that the extent of this *Middle bank* is about 2½ square miles within the limits of the 20-fathom line.

NE. ½ N. 7½ miles from Race rocks, and SE. by S. 4 miles from the entrance to Victoria harbor, are a couple of spots showing 9 and 13 fathoms. It is named the *Constance bank*.

Off Point Partridge (the western head of Whidbey island) is a 10-fathom bank, with muddy bottom. We have run across it and found this depth, but the locality has not been sounded out.

This bank was discovered by Vancouver in 1792.—(Vol. I, p. 291.)

We have named it the *Partridge bank*.

ROSARIO STRAIT.

This strait was first seen by Quimper from Port Discovery, and called "Boca de Flon." From Protection island he could see through the whole length of the strait; he could not see Deception Pass from there.

Eliza passed through it in 1791, and called it the Canal de Fidalgo.

Vancouver passed through it in 1792, and gives its peculiarities very well.

Galiano and Valdes came through it in 1792, and called it Canal de Fidalgo.

The United States Exploring Expedition, in 1841, called it Ringgold's Pass channel.

The English Admiralty chart of 1847 has it Rosario strait, and by this name it is always known on the Pacific.

Rosario strait is the eastern of the two principal channels running through the Archipelago de Haro, between Vancouver island and the main. Its southern entrance lies N. by E., distant 7 miles from Smith's island, and is 4¼ miles wide. The western point of the entrance is formed by a point running out from *Watmough Head*,(1) which is 450 feet high and on the southeast part of *Lopez island*.(2) Off this point lie several rocky islets, with deep water among them and a rushing current. The outer one, named Southwest island,(3) is about 50 feet high, rocky, flat-topped, destitute of bush or tree, narrow, and about one-third of a mile in length, east and west. S. 83° E. from it, at a distance of half a mile, lies *Entrance rock*, possibly bare at the lowest tides. A patch of kelp exists upon and around it, but the kelp is generally run under the surface of the water by the strength of the current. We discovered and named this rock in 1854, The English Admiralty chart of 1859 calls it Davidson's rock.

The whole southern face of Lopez island is guarded by rocks and reefs. The island itself is very rocky and moderately low.

On the eastern side of the entrance is a small wooded islet called Deception island,(3) at the mouth of *Deception Pass*, an intricate and very narrow 3-fathom channel, 3 miles long, running between the north end of Whidbey island and the south end of *Fidalgo island*.(4) In 1841 the United States brig Bainbridge

(1) Named Watmough Head by the U. S. Exploring Expedition in 1841. On the first sheets of the U. S. Coast Survey called Walmough Head. On the English Admiralty chart of 1859 called Walmouth Hill. The Indian name is Noo-chaad-kwun.

(2) Vancouver determined it to be an island in 1792. In 1841 the U. S. Exploring Expedition named it Chauncey's island. English Admiralty chart of 1847 has it Lopez island, and always known by this name on the coast.

(3) Named by the U. S. Coast Survey in 1854.

(4) Named by Eliza in 1791. Called Perry's island by the U. S. Exploring Expedition in 1841.

passed through it from the eastward. It is the Boca de Flon of Eliza, 1791, but is now known only by the apt designation given above.

Vancouver called it Deception Pass in 1792; Galiano and Valdez called it Boca de Flon, thinking with Eliza that it was the strait of that name seen by Quimper in 1790. It was named Deception Pass by the United States Exploring Expedition in 1841.

In the middle of the entrance to Rosario strait Vancover anchored in 37 fathoms, black muddy bottom, in 1792.

When at the entrance, and 1½ mile from the western side, a line will pass clear of everything from one end of the strait to the other. This course is N. by W. ½ W., and the distance 19½ miles to the north entrance. It passes between Bird and Belle rocks, and almost tangent to Point Lawrence, on Orcas island. Taking the courses through the mid-channel we should have the following: NW. by N. ⅔ N. for 11¼ miles; N. by E. ¾ E. for 3¾ miles; and NW. ½ W. for 6½ miles—making a total of 21½ miles.

The shore for the first two miles on the western side is moderately high, declining to a point, a quarter of a mile off which lies Kellett's ledge,(1) bare at the lowest tides, and having deep water all around it. The ledge is marked by a mass of kelp. Thence the shore makes a deep bend for a mile to the westward, with a low beach and marsh, over which *Lopez bay*(2) can be seen. This bend is called *Shoal bight*,(3) and has from 6 to 10 fathoms for a mile out, with level sandy bottom. In mid-channel rise the *Bird Rocks*,(4) about 40 feet high, consisting of three small rocky islets very close together, and running in a north direction. They are somewhat pyramidal in form, and during the summer show yellowish, on account of the parched grass and the color of the rocks. Abreast of them, on the western side, is a narrow opening between two low rocky heads of Lopez and *Decatur islands*.(4) Inside is a line of islets ranging from the north head, and making the channel run towards the south. This barrier is called the Lopez Chain,(1) and the entrance the Lopez Pass.(1) Several large islands are found inside. Vancouver's boats evidently were in this bay, as his chart gives a good general idea of it. The anchorage of Shoal bight continues some distance northward of this opening, and abreast of some moderately high white bluffs. N.NE. three-quarters of a mile from Bird rocks lies *Belle rock*, directly in mid-channel, making a very dangerous position. It shows 4 feet above the very lowest tides, and is covered by a patch of kelp, which is, however, generally run under by the strength of the currents. The rip upon it can sometimes be seen when the water is smooth, but with light winds and high tides its existence would not be suspected. On all sides of it the water is very deep. The extent of rock above water is about 20 feet square. We discovered and named this danger in 1854, and while placing a signal upon it noticed that the tide rose nearly 1½ foot while the current was yet running ebb at the rate of 3 miles an hour. Between it and the Bird rocks there is a submarine ridge with plenty of water, but marked by strong eddies. The steamship Republic lately ran upon this rock, and more recently the pilot-boat Potter.

After passing Deception island on the east side of the entrance, the face of Fidalgo island is high, precipitous, and bare for two or three miles in a northwest direction. This is called Sares Head.* It then sweeps to the north, changing to the westward until abreast of and two miles from Belle rock. In this deep bay, and lying well off shore, are, first, *Williamson's rocks*,* a cluster of rocky islets about 40 feet high, with deep water close around them. From Deception island they bear NW. ⅔ W. 3 miles distant, and from Southwest island off Watmough Head, NE. 5 miles. Half a mile northward of them is *Allan island*,* which is about three-quarters of a mile in extent, and about 200 feet high, with its southern face partly bare. A quarter of a mile off its SW. face lies the *Denis rock*.* This is never bare, but its position is marked by a patch of kelp.

North of Allan island, and separated from it by a channel a quarter of a mile wide, is *Burrows's island*,* 1½ mile long SE. and NW. by half a mile in breadth. The island is between six and seven hundred feet high, and has a remarkably flat top, is wooded, and may be seen from the Strait of Fuca. At the eastern end of the

(1) Named by the U. S. Coast Survey in 1854. Lopez pass is called Maury pass on the English Admiralty chart, 1859.

(2) Called the Macedonian Crescent by the U. S. Exploring Expedition in 1841; named Lopez bay by the United States Coast Survey in 1854.

(3) Named by the U. S. Coast Survey in 1854. We were the first to discover this available anchorage. It is called Davis's bay on the English Admiralty chart of 1859.

(4) Named by the U. S. Exploring Expedition in 1841.

* Named by the U. S. Exploring Expedition, 1841.

passage, between the last two islands, is a small one called *Young island.** Through all the channels formed by these islands a good depth of water exists, and no dangers have been discovered.

The breadth of Rosario strait at Belle rock is 3½ miles; but it is soon contracted by *James island,** on the western side, and opens into a channel N.NE. called the *Bellingham channel,*† which is about two miles wide at its entrance. A small channel runs from it more to the eastward along the north shore of Fidalgo island, and leads into Padilla bay. Upon Fidalgo rises Mount Erie* to a height of 1,250 feet, covered with woods, and presenting a flat appearance from certain directions. James's island consists of two heads a mile apart, and 250 feet high, but connected by a narrow ridge. The southern head is the higher, and not very heavily timbered. Close to the west of the ridge lies another head, connected with Decatur island by a low sand beach.

Just below James's island is an opening on the west between Decatur island and Blakely island,* with 25 fathoms in it, but a rock, covered at a quarter flood, exactly in the middle of the entrance. On the east, half a mile up the strait, appears the SW. point of *Cypress island,*‡ off which lie rocks and foul bottom for half a mile on a line to Burrows's island. Around this locality extends a large body of kelp. The southern face of Cypress island consists of alternate perpendicular white cliffs, and sloping ground covered with fern or trees. On its western side, and 1¼ mile from the southwest point, is found a snug little harbor called *Strawberry bay,*‡ which is formed by the retreating of the shore-line, and an outlying rocky islet called Strawberry or Hautboy island.* In this bay excellent anchorage is found in from 6 to 10 fathoms, muddy bottom. Good fresh water is plenty here. A high white cliff is seen to the south of the harbor, from the shores of which rise rapidly the Lake mountains,(1) to an elevation of 1,525 feet, and among whose peaks we found two large sheets of fresh water. These peaks are very noticeable from the Strait of Fuca, and being connected by comparatively low ridges with other hills on the island, they present a saddle-like appearance from the southward and westward.

Abreast of Strawberry island the channel contracts to a width of 1½ mile, where the bold rocky face of Blakely island rises to a height of between 900 and 1,000 feet. The greatest elevation of the northern part of the island is 1,044 feet. Nearly half a mile SE. from its east face lies a very small low rock called *Black rock,*(1) and half way between it and the south end of the island is a *white rock,*(1) a quarter of a mile from the shore. In this narrow part of the strait the depth of water is about 60 fathoms, and the current goes through with a roar like the sound of a gale of wind through a forest. When at anchor in 10 fathoms, under the low point 1½ mile north of Strawberry island, we found the current four miles per hour, and swirling so much that the vessel had to be steered to prevent her breaking her sheer. Thence the strait widens northward, and at the north end of Blakely, two miles above Strawberry island, two channels lead to the westward around Obstruction island,(2) which lies between Blakely and Orcas islands. Both are narrow, and off the entrance to the south lie some sunken rocks, and others above water. Blakely island and Orcas island are three-quarters of a mile apart.

When in the narrowest part of Rosario strait, a very marked perpendicular rocky peak is seen to the north over the low point of Cypress, and soon shows rising abruptly from the water's edge to a height of 750 feet. It is called Bald Peak.(3) Abreast of it the channel takes the first turn, changing its course to N. by E. ¾ E. for 3¾ miles. Half a mile off the north end of Cypress island is a small islet covered with trees, and called Rock island.(1) NW. of it are some sunken rocks, but their exact position is not accurately known. The comparatively low island half a mile N.NE. of Cypress is *Sinclair island,*(4) the highest part of which is towards the eastern end. Off the northeast face of Sinclair island, and stretching half a mile, is Boulder reef,(5) visible at extreme low tides. It is covered with kelp, which is, however, generally kept under the surface of the water by strong currents. A huge erratic granite boulder is seen at ordinary tides inside of the outer point of the reef, and bears from it S. 70° E., distant 500 yards. From the western point of the island the reef bears exactly north, distant three-quarters of a mile. The revenue cutter

* Named by the U. S. Exploring Expedition, 1841.

† Named by the U. S. Coast Survey, 1854. The Indian name is Tut-segh.

‡ Named by Vancouver, 1792. The Indian name for Strawberry bay is Tutl-ke-teh-nas.

(1) Named by the U. S. Coast Survey, 1854.

(2) Named by the U. S. Exploring Expedition, 1841.

(3) Named by the U. S. Coast Survey in 1854. The Indian name is Sheh-ung-tlh, signifying the home of the Thunder-bird.

(4) Laid down by Galiano and Valdes as Isla de Ignaso. Received its present name from the U. S. Exploring Expedition in 1841.

(5) Named by the U. S. Coast Survey in 1854. Called Panama reef on English Admiralty chart of 1859.

Jefferson Davis and the steamship Panama have been upon it since we discovered it in 1854. On the north side of the island is anchorage in 10 to 15 fathoms half a mile off shore.

Three miles from Sinclair island lies *Orcas*, on the northwest side of the strait. It is a large island, with a mountain 1,120 feet high near its southern end. The point stretching furthest east and coming down to the water is *Point Lawrence*,* and the low, treeless islets and reef passed 1½ mile before reaching this point, and lying over half a mile off shore, are the Peapods.* Deep water is found close to them. When upon this same mid-channel course, the island ahead is *Lummi island*.† Its southern half is very much higher than the northern, and attains an elevation of 1,560 feet. The rock nearly 100 feet high off the highest part of the ridge, and a third of a mile from shore, is the *Lummi rock*,‡ and a capital boat harbor is found on its northwest side. A mile off its south end are the *Viti rocks*,* about 25 feet high, with plenty of water around them.

Abreast of Point Lawrence the channel is over three miles wide, and it there changes to NW. ½ W. for 6½ miles to a line joining the *Matia group* with the north end of Lummi island. From Point Lawrence, along the north face of Orcas, the shore is rocky and precipitous, and rises by two or three plateaux to Mount Constitution,§ which is less than a mile in-shore and 2,423 feet high.

The geographical position, as determined by the Coast Survey in 1854, is:

	° ′ ″
Latitude	48 40 37.2 north.
Longitude	122 49 0.83 west.

The course out passes on the west some small rocky islets called *The Sisters*,* marked by one or two stunted fir trees; then *Clark's island** and *Barnes's island*,* close under its western side, leaving a channel a mile wide between it and the north shore of Orcas, with very deep water and no anchorage. Abreast of Clark's island, on Lummi island, is a contracted anchorage and shelter from northerly winds under a low point called Village Point.* The anchorage is in 10 to 15 fathoms, but there is no fresh water, and the large Indian village is now deserted. After passing this point, anchorage may be obtained half a mile from shore in from 8 to 15 fathoms. Close to Clark's and Barnes's islands the depth is 50 and 60 fathoms, and a very strong current runs near them. The channel between Village Point and these islands is two miles wide.

W.SW. of the north end of Lummi island, and four miles distant, are three islands very close together, called the *Matia group*.(1) A mile and a half to the westward of them lies the *Sucia group*, consisting of one large and six small islands, with a reef off the north side of the group, and a beautiful harbor a mile long and half a mile wide, opening to the east, and carrying from 10 to 15 fathoms sticky, mud bottom.‖ To the westward of this group lies *Patos island*, and a much smaller one close to its SW. point. The eastern point of Patos island bears W. ¾ S., 9 miles from the north end of Lummi. Two or three miles N.NE. of Lummi island opens a shoal bay, backed by low marshy ground, which is covered with trees and swamp undergrowth Into it empties one or two mouths of the Lummi river. The main entrance of that stream is at the north part of the bay, and can be reached with boats only at high tide. The NW. boundary of the bay is a low grassy point with a few bushes upon it, called *Sandy Point*.* From the north point of Lummi island it bears N. by W. ½ W., distant 2¼ miles. Between these two points anchorage is had in from four to six fathoms, but the south end of Sandy Point should not be approached within less than half a mile. Down the east side of Lummi island, which is about a mile in breadth, runs Hale's passage,* three-quarters of a mile wide. It leads from Bellingham bay. In this passage 1½ mile, and bearing E. by S. ½ S. from the north end of

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* Named by the U. S. Exploring Expedition, 1841.

† Called Isla de Pacheco by Eliza in 1790; McLaughlin's island by the U. S. Exploring Expedition in 1841; named Lummi island in 1853 by the U. S. Coast Survey, because inhabited by that tribe. It is known by no other name.

‡ Named by the U. S. Coast Survey in 1854.

§ Named by the U. S. Exploring Expedition in 1841. The Indian name is Sweh-lagh.

(1) Called "Edmund's group" by the U. S. Exploring Expedition in 1841. The small one on the east is called Puffin island on the English Admiralty chart of 1859.

‖ Partially examined by the U. S. Coast Survey in 1853 and 1858.

Lummi island, is a low sandy point, upon which was established in 1853 a secondary astronomical station of the United States Coast Survey. Its geographical position is:

	°	′	″	
Latitude	48	44	01.7	north.
Longitude	122	40	36.9	west.
	h.	*m.*	*s.*	
Or, in time	8	10	42.5.	

This places the north end of Lummi island in—

	°	′	″	
Latitude	48	44	53.2	north.
Longitude	122	42	11.9	west.

The following geographical positions will serve to check the courses and distances we have given:

	°	′	″	
Matia island, east, latitude	48	44	36.8	north.
" " longitude	122	48	28.6	west.
	°	′	″	
South end of Strawberry island, latitude	48	33	34.3	north.
" " " longitude	122	43	26.7	west.
	°	′	″	
Southwest island, off Lopez island, latitude	48	24	53.3	north.
" " longitude	122	48	33.9	west.

Alden's shoal.—From the north point of Lummi an extensive shoal bears W. by N. $\frac{1}{4}$ N. $5\frac{1}{3}$ miles, and NW. by N. $\frac{1}{2}$ N. $3\frac{1}{2}$ miles from the eastern of the Matia group. It lies upon the last direct course out of the strait, but has not been completely sounded out. Within the 15-fathom curve it is at least two miles square, and may be used when a vessel loses the wind and has a strong adverse current; but the swirls and eddies upon and around it will be very apt to foul any anchor.

The least water found on this bank is $2\frac{3}{4}$ fathoms, and this spot bears N. 35° W., $3\frac{1}{2}$ miles from the eastern islet of the Matia group.

From about its middle part we have the following bearings of prominent objects:

Eastern of Matia group, SE. by S. $\frac{1}{2}$ S. $3\frac{1}{2}$ miles.

North point of Lummi island, E. by S. $\frac{1}{4}$ S. $5\frac{1}{3}$ miles.

NW. point of Sucia group, with the wooded island of the Skipjacks just open, SW. $\frac{1}{4}$ S. four miles. This position will bring the west side of Clark's island just on with Point Lawrence.

The shoal was discovered by the United States Coast Survey in 1853.

It is named Alden's bank on the English Admiralty chart of 1859.

In 1857 we attempted to reach this bank four or five times, from an anchorage off Hale's passage, with light airs, but the currents invariably swept us away from it. Recently it has been anchored upon by the United States Coast Surveying brig Fauntleroy.

GULF OF GEORGIA.*

Once in the Gulf of Georgia, through either channel, the three-mile face and timber-covered bluffs of Point Roberts† (showing almost as an island) is seen to the northwest. On the west the mountains of Vancouver and its bordering islands rise up precipitously, and on the eastern or main shore a series of wooded cliffs 200 feet high. Far to the eastward the Cascade range is seen rising above intermediate ridges, with the snow-covered summit of Mount Baker,* which rears its head 10,900 feet above the level of the sea. To the W.NW. stretch the waters of the Gulf of Georgia, nine miles wide, abreast of Point Roberts, where it is narrowest, but spreading out to 20 miles, and having a length of 120. A short distance above the 49th parallel it receives Fraser's river, (the third great stream of the northwest coast,) the branches of which spread towards the Cascade range of mountains.

If bound up the Gulf, vessels hold well to the eastern shore to avoid the rushing currents, and to take the chances of an anchorage if the wind fails.

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* Named by Vancouver, 1792.

† Named by the U. S. Exploring Expedition, 1841. The Indian name is Now-uk-sen.

From Sandy Point to *Point Whitehorn** the general trend of the shore is NW. ½ W., and the distance 7 miles. The shore is a steep bluff, about 150 feet high, and covered with wood. At Whitehorn the face of the point is worn away by the action of the sea, and shows bright, with rocks at its base.

BIRCH BAY.

The southern point of this fine bay is Point Whitehorn, and the northwest shore is formed by a long rounding high bluff, bearing about NW. from Whitehorn, and distant 3 miles. The bay runs N.NE. 2½ miles, with a width of 1½. The bottom is very uniform, with capital holding-ground of soft mud in from 4 to 10 fathoms. The immediate shores are low, and edged with marshy patches, thick undergrowth, and heavy wood. No directions are necessary for entering, as there is a depth of 15 to 20 fathoms a mile outside, and 10 fathoms water on the line of the entrance. During the heaviest southeast weather no swell is felt here in a properly selected anchorage. We searched for fresh water, but found none in the space of more than a mile along its southeastern side.

The approximate geographical position of Point Whitehorn is—

	° ′ ″
Latitude	48 53 07.3 north.
Longitude	122 46 27.1 west.

It received its present name in 1792 from Vancouver, who placed it in latitude 48° 53½′.—(Vol. 1, pp. 315, 316.) The Indian name is Tsan-wuch.

This is the furthest point northward to which our personal examinations have extended.

Drayton harbor.—Passing the bluff NW. of Birch bay the shore trends about N.NE. for nearly 3 miles, and terminates in a long, low, sandy point, behind which lies Drayton harbor—a small land-locked bay having a depth of 10 fathoms just inside the entrance, but very shoal over nine-tenths of it. It opens to the north at the extremity of the sand point. With the end of the point bearing N. 60° W., half a mile distant, the anchorage would be in 6 fathoms. South of this position it shoals gradually for over half a mile to 12 feet, with sticky bottom.

The approaches to the bay do not show over 5 fathoms at a distance of a mile from the shore, and the same depth is found on gradually nearing the end of the low point. The southeast shore of the harbor is flat and marshy, and is not separated by much more than a mile from Birch bay.

In this harbor the United States and British steamers attached to the Northwestern Boundary Survey were accustomed to anchor (1857.) The American commissioner encamped on the bluff about a mile north of the boundary, the site having been selected on account of fresh water, but it has an extensive flat in front.

Drayton harbor was examined by the United States Exploring Expedition in 1841.

A map of it was published by the United States Coast Survey in 1858.

Semi-ah-moo bay.—This extensive bay stretches three or four miles to the westward of Drayton harbor, and is bounded on the north by a bluff from 300 to 400 feet high, covered with fir. The bottom is very regular, and the depth ranges from 10 fathoms soft, about two miles south of the bluffs, to 3 fathoms within half a mile of them.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is IV*h.* L*m.*, and the difference between the greatest and least intervals is 2*h.* 24*m.* The mean rise and fall of tides is 5.9 feet; of spring tides, 10.9 feet. The mean duration of the flood is 6*h.* 11*m.*; of the ebb, 6*h.* 19*m.*, and of the stand 29*m.*

To find the times of high and low water first compute them for Fort Townshend, and add 1*h.* for Semi-ah-mo bay.

A map of this bay was published by the United States Coast Survey in 1858.

Stretching to the northwest is a large shallow marshy bay, fringed with trees and bushes. From its northern shore low land extends as far back as Fraser river. The western boundary of the bay is formed by the eastern shore of Point Roberts. It is named Mud bay on the United States Coast Survey map.

POINT ROBERTS.

When seen from the northern entrances of the Canal de Haro and Rosario strait this point stands out near the middle of the Gulf of Georgia as a bold wooded island. From Rosario strait the southwestern point bears nearly NW. by W. about 18 miles. From Point Whitehorn it bears west distant 12 miles.

* Named by the U. S. Exploring Expedition, 1841.

On the outer or Gulf of Georgia side of Point Roberts the shore runs about NW. ¼ W. for 9 miles to the southern and principal mouth of Fraser river. To the mouth of the river at the outer edge of the *Sturgeon bank* the bearing is W. by N. and distance 9⅔ miles. The south face runs E.NE. 2½ miles, and presents for nearly the entire distance a bold bluff about 150 feet high, and covered with wood. Half a mile off this shore anchorage may be had in from 10 to 15 fathoms, but in southerly weather it must be avoided. The eastern shore of the point runs nearly parallel with the western for 4 or 5 miles. Off the southeast point rocks and foul bottom stretch out SE. for quite a mile.

The geographical position of the southwestern point, as determined by the United States Coast Survey, is—

	° ′ ″
Latitude	48 58 15.1 north.
Longitude	123 04 16.5 west.

It is therefore nearly two miles south of the northwestern boundary of the United States. Between this station and the bluff lies a marsh.

Point Roberts was discovered and named the Peninsula de Cëpèda in 1791. It was named Point Roberts by Vancouver in 1792, and is called Roberts Point on English Admiralty charts of 1847 and 1859.

BRITISH COLUMBIA.

The southern part of this territory was named New Georgia by Vancouver in 1792. It received its present name by order of the British government in 1858.

FRASER RIVER.

The mouth of the river on the Gulf edge of the Sturgeon bank lies W. by N. 9⅔ miles from the southwest part of Point Roberts. That part of the bank south of the river is now called Roberts's bank, and to that northward is retained the name Sturgeon bank, given to the whole by Vancouver in 1792.

The current of the river is said to have a velocity from 5 to 8 miles in some parts. Throughout its navigable extent it is very narrow and crooked. Since the discovery of gold in this region a large traffic has arisen, and several steamboats run upon the river.

The southern point of the entrance to the river is named Pelly Point; and the northern, Garry Point.

The following official notice in relation to the buoys through the Sturgeon bank is all that we have to present. It was published in September, 1859:

The entrance to Fraser river has been rebuoyed. All the buoys are placed on the northern or port side of the channel on entering, with the exception of one on the south sand head.

The following memorandum points out the position and gives the description of each buoy:

On the south sand head.—A spar-buoy moored in 11 feet at low water. The spar is painted white and black in horizontal stripes, and surmounted by a ball of the same colors, also in horizontal stripes.

On the north sand head.—A spar-buoy moored in 11 feet. The spar is painted black and white in vertical stripes, and surmounted by a ball painted in the same manner.

On the north side of the channel.—A spar-buoy moored in 9 feet. The spar is painted in black and white in horizontal stripes, and surmounted by a red ball.

1. A spar-buoy moored in 12 feet. The spar is painted in black and white horizontal stripes, and surmounted by a white diamond marked 1.

2. A spar-buoy moored in 12 feet. The spar is painted white and surmounted by a black diamond marked 2.

3. A spar-buoy moored in 11 feet. The spar is painted white and surmounted by a red diamond marked 3.

4. A spar buoy moored in 11 feet. The spar is painted white and surmounted by a crescent red and black, marked 4.

5. A spar-buoy moored in 12 feet. The spar is painted in black and white vertical stripes, surmounted by a red crescent, marked 5.

On entering the river, the Sand head buoy should not be approached within half a mile until the passage between them is brought to bear N. ½ E., when a vessel may steer in, mid-channel, or pass the north Sand head buoy and the first one inside it about 300 yards.

The remaining five buoys on the north side of the channel may be passed from 100 to 250 yards, keeping them on the port hand. After passing the inner buoy a straight course may be steered for Garry Point.

It should be remembered that the ebb current sets to the southward over Roberts' bank, and the flood to the northward over the Sturgeon bank.

The buoys assume a leaning position, varying from an angle of 35° to 80° according to the state of the current and wind, and can be plainly seen from vessels' decks at a distance of 3 miles in clear weather

By following the foregoing directions, a vessel drawing from 15 to 16 feet of water may enter the Fraser river with safety at half tide.

Vessels from the southward passing Point Roberts must avoid Roberts' bank, which is very steep; by not bringing the low part of the point to the southward of east the bank will be cleared.

The river was discovered by Eliza in 1790; and in 1792 Galiano informed Vancouver that it was called the Rio Blancho, (Blanco,) in honor of the then prime minister of Spain, but that it had been searched for in vain. It receives its present name from its explorer.

The shoal off it Vancouver called *Sturgeon bank* in 1792.

NANAIMO BAY.

This bay lies on Vancouver island beyond the 49th parallel, and we refer to it because supplies of coal (lignite) are there obtained by many steamers.

The outer entrance to the harbor is in latitude 49° 12′ north, longitude 123° 51′ west, and bears W. ¼ N. 33 miles from Point Roberts. From the entrance the mid-channel course runs S. ½ W. five miles, passing a small island on the northwest at the distance of a mile, and a large island, with islets off its north point, three-quarters of a mile on the east. This course gradually approaches Douglas island on the west, abreast of a wide channel to the east, and is rounded quite close. The mines will then lie about W.SW. a mile distant, with a small islet in front of them. The bottom is uneven; some sunken rocks occur, and the anchorage near the rivers is so contracted that vessels must moor. Pilots will be found here to take vessels in.

The price of the coal per ton is about six dollars, but it is light; occupies one-fifth more space than Welsh coal; burns rapidly with flame and much smoke; disengages a great deal of gas, and produces clinker in abundance. It is, however, superior to the coal of Bellingham bay.

The usual spelling of this name is Nanaimo, but that best representing the sound is Nah-ny′-moh.

Of the western shores of the Gulf of Georgia we can say but little. The currents rush past its precipitous shores with great velocity, and quite recently the coast surveying brig drifted, with 38 fathoms of chain at her bows, in a calm, for miles along and within 80 yards of the rocks before she brought up. In one or two instances preceding this the lead indicated bottom in 10 fathoms, the next cast showing 40 or 50 fathoms.

ARCHIPELAGO DE HARO.

THE TWO STRAITS.

The experience of three seasons' surveying in this immediate locality has not increased our relish for navigating these channels in sailing vessels. With plenty of wind no navigation could be better, but in a calm vessels will frequently be jammed close to rocks, with only a few fathoms inside of their positions, but 40 or 50 outside, and a swirling current that renders towing with boats utterly impossible. Frequently, too, boats have been nearly swamped by the tide rips that exist through them. Off East Point, as an instance, a five-oared whale-boat entirely failed in trying to hold her own against the current, which we judged to be *rushing* (the only term applicable) at the rate of seven miles per hour. Throughout the Canal de Haro the roar of the conflicting currents can be heard for miles, and the main current runs frequently six miles per hour. No anchorages exist in this channel, except at Cordowa bay, but it is free of known hidden dangers, except *Unit rock*, and the continuation of the reef off Darcy island. It is 10 miles longer than the Rosario strait, and makes a right angle in its course, but is a mile wider, and has much deeper water. Rosario strait is less curved, has several anchorages and known dangerous rocks, and a current of about 1½ mile less per hour. For steamers, either channel, or even some of the narrow intermediate channels, may be used; but for a sailing vessel the Rosario passage is preferable, although the total distance from the middle of the Strait of Juan de Fuca to the middle of the Gulf of Georgia is five miles longer. The winds are apt to fail in both channels, and during summer frequent calms prevail.

BELLINGHAM BAY.

Before passing to a description of Admiralty inlet we will notice this bay, as mines of coal (lignite) have been opened upon its shores.

After leaving Rosario strait, the course upon entering the Bellingham channel,* two miles wide, opening south of Cypress island, is NE. for two miles. The width then decreases to a mile upon turning sharp around the SE. point of Cypress, and to the eastward are seen the bright bluffs of *Guemes island.* Between these two islands the channel runs about three miles on a N. by W. ½ W. course. Abreast of the north end of Guemes, (which is a steep bluff,) and on the west side of the channel, are several small, high, wooded islets, called the *Cone islands.*† The moderately low, wooded island facing the channel is Sinclair; vessels pass between the southeast point of it and the north end of Guemes. The island a couple of miles to the NE. is *Vendovi;*† pass north of it, but south of the small islet, (off Eliza's island,) which is two miles NE. by N. from the NW. point of Vendovi, and the southern part of Bellingham bay opens to the southeast; its northern part opens to the N.NW.

If the current be flood and the wind light, keep close around Guemes and Vendovi, so as not to be set past Sinclair island. The low, bare, rocky islets, 1½ mile NW. of Vendovi, are the Viti rocks;† and the point between them and Eliza's island is the southern extremity of Lummi island. From the islet last passed, a point on the eastern shore lies nearly north five or six miles distant. Run past this and follow the trend of the shore for two or three miles to the deepest part of that part of the bay, when houses, &c., will denote the position of the mines and the villages of Sehome and Whatcom. (3) Half a mile from the shore is capital anchorage in four fathoms, soft bottom, and the bay there is very smooth.

The general direction of Bellingham bay is SE. and NW.; its width three miles and length 14, extending from latitude 48° 33′ to latitude 48° 48′. The depth of water ranges from 3 to 20 fathoms, with good sticky bottom.

We believe there are several companies mining here, but the amount of coal obtained is not great. Its quality is not good, the furnaces producing sometimes as much clinker and ashes in bulk, and half the amount in weight, of the coal put in. Deleterious gas is freely disengaged, and the combustion also evolves clouds of black smoke. In the experiment which we witnessed, in 1853, the steamer's furnaces could not, in two attempts, be kept up so as to produce a sufficiency of steam.

A saw-mill is located upon the bay at one of the villages.

Bellingham bay was first surveyed by Whidbey, under Vancouver's orders, in 1792, and then received its present name. In some recent maps the northern portion is called Gaston bay, and for the southern part the original name is retained; but Vancouver's designation is that universally adopted on the western coast.

A military station is located at the upper part of the bay, opposite to the coal mines.

A hydrographic sketch of the bay was published in the Coast Survey report for 1856.

The amount of shore-line in the Archipelago de Haro, Bellingham bay, Possession sound, &c., is 627 miles.

We never heard thunder in this Territory, except in one instance, at Cypress island, in Rosario strait.

ADMIRALTY INLET.

General features.—This inlet may be described as a vast canal, commencing at the southeast extremity of the Strait of Juan de Fuca, and running in a general SE. by S. direction for 60 miles to the south end of Vashon's island. It has for that length an average width of 3½ miles, and then branches into a multitude of arms, which cover an area of about 14 by 22 miles. Their general direction is SW. ¾ S., and they comprise what is called *Puget's sound.*

At 16 miles from the entrance to the inlet an arm called *Hood's canal* opens upon the western side, and runs 60 miles S. by W., with an average width of 1½ mile. Twenty-five miles from the entrance of the inlet another arm opens on the eastern side, runs north and northwest behind Whidbey island, forming Possession sound, Ports Gardner and Susan, &c., and leads on to the Strait of Juan de Fuca through Deception Pass, at the north end of Whidbey island.

The shores are generally bluffs, ranging from 50 to 500 feet in height, with their sides kept bright by

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* Named by the U. S. Coast Survey in 1854.

†Named by the United States Exploring Expedition, 1841.

(3) The Indian name for "Noisy Water," the outlet of the lake.

the gradual wearing action of the water, and their tops covered with trees and thick undergrowth to their very edges. There is so much sameness in the shores that it requires some acquaintance with the different points to recognize them by their trifling peculiarities. The depth of water in the channels is remarkably great, perhaps averaging 100 fathoms, and it is sometimes difficult to find anchorage sufficiently far from the shore to afford room for getting under way. Many superior harbors are found in every direction, and small settlements are gradually springing up in favorable localities.

Admiralty inlet, Hood's canal, and Puget's sound, have an aggregate shore-line of not less than 803 miles, yet the number of dangers known to exist in them is remarkably few.

One of the inlets or arms of Puget's sound reaches within two miles of the head of Hood's canal, and between them lies a large lake. The southern waters of this sound are also within 65 miles, in a direct line, of the Columbia river, at the mouth of the Cowlitz, which is 52 miles from Cape Disappointment; and within 20 miles of the upper waters of the Chehalis river, which runs into Gray's bay. At present the route travelled from the Columbia is by canoes, for 28 miles, up the Cowlitz to the settlement at "Cowlitz Landing," (or by horse over a somewhat bad path,) and then by horses or mules to Olympia, 52 miles, over a tolerably level country, and by a road moderately good in summer but bad in winter. The distance can be made in one day with a good horse. From where the road strikes the Chehalis the river is said to be navigable for large boats to Gray's harbor. We judged the stream to be about 100 yards wide. It had apparently plenty of water and a slow current. The Cowlitz has a rapid current, and at a low stage of the water canoes are poled up its channel; during freshets they are dragged up, the crews clinging to the branches of the trees upon its banks. Two days of labor are then required for the trip, but in summer it is made in one.

The importance of these close relations of the waters of the Columbia river, Puget's sound, Admiralty inlet, Gray's harbor, and Shoalwater bay, in view of the prosperity of the two Territories, must be manifest without entering into details of the feasibility of their connection by railroads and canals.

The inlet was discovered by Quimper, in 1790, and called the Canal de Caamano. It was first explored and made known, in 1792, by Vancouver, who applied the present name to it.

A reconnaissance sketch of Admiralty inlet was published by the Coast Survey in 1854.

We shall not attempt to give in full and explicit detail all the peculiarities of this vast area of waters, but, following the mid-channel courses, will only note generally the objects as they come under the eye of the navigator.

The entrance to the inlet lies between Point Partridge, on Whidbey island, and Point Wilson, on the main, at the entrance to Port Townshend. The bearing of the latter point from the former is SE. by S. ½ S., 4½ miles; and the bluff head lying two or three miles to the east of this line, and destitute of trees and marked by a light-house is Admiralty head, around which the ebb current, and an ebb eddy on the flood, sweeps with force.

The first course inside of the entrance of the inlet is E.SE. 6½ miles, passing Port Townshend on the south, Admiralty head on the north, and changing the course abreast of Marrowstone Point on the W.SW.

Point Partridge is the western point of Whidbey island, and directly faces the Strait of Juan de Fuca. It is very steep and yellow, and flat on the summit, which is covered with spruce, fir, and cedar. The point is so rounding that it is not easily recognized on coming from the westward, but from the south and north it is well marked and prominent. Its face is composed of loose sand, which, being blown up the hill by the strong west winds, has formed a very peculiar ridge on the outer face of the top. This is so narrow that it can hardly be travelled, and in many places it is 35 feet above the ground inside; yet, being overgrown with bushes, the ridge is now permanent.

The highest part of the point is about 260 feet above low water.

The triangulation station of the Coast Survey was on the southern part of the point, and its approximate geographical position is:

	°	′	″	
Latitude	48	12	59	north.
Longitude	122	45	07	west.

From Point Wilson it bears NW. by N. ½ N., 4¼ miles.

From Admiralty Head light-house NW. by W. ¾ W., 5¼ miles.

The point received its present name from Vancouver in 1792.

PORT TOWNSHEND.

This harbor is favorably situated at the termination of the Strait of Juan de Fuca, at the outlet of the waters of Admiralty inlet, Puget's sound, &c., and in proximity to the great inland waters of British Columbia. The entrance lies between Point Wilson* and Marrowstone Point,* the latter bearing E.SE. $3\frac{5}{8}$ miles from the former. Upon this line, and even outside of it, lies a bank extending two-thirds of the distance from Marrowstone, and having from 6 to 15 fathoms, with hard, sandy bottom. Inside of Point Wilson, which is composed of low, sandy hillocks, as heretofore described, lies another low point called Point Hudson,† distant $1\frac{3}{4}$ mile, SE. by S. $\frac{1}{2}$ S.

Starting from the entrance line, about $1\frac{1}{2}$ mile from Marrowstone, the mid-channel course of the bay is S.SW., three miles, with an average width of two; thence SE. $\frac{1}{8}$ S. for $3\frac{1}{4}$ miles, with an average width of $1\frac{1}{4}$. The depth of water throughout is very regular, and ranges from 8 to 15 fathoms, with soft, muddy bottom inside of Point Hudson. Vessels coming from the strait steer for Point Hudson, as soon as it is opened by Point Wilson, passing the latter close, as 20 fathoms are found 100 or 200 yards off it. Upon approaching Point Hudson, and when within half a mile of it, gradually keep away about a quarter of a mile in from 5 to 10 fathoms, and, as it opens, run quite close, with the summer wind off shore, to save making a tack; keep along half a mile to the town situated under the Prairie bluff, and anchor anywhere off the end of the wharf, in 10 to 12 fathoms, about a quarter of a mile from shore. In winter anchor further out, to clear Point Hudson in getting under way with a southeaster.

When coming down the inlet, bound into the bay, with the current ebb, pass Marrowstone nearly three-quarters of a mile before heading in for the town, and so avoid a very strong eddy which comes out of the bay along the bluff shore west of this point. If the wind be light and the current strong, pass the point quite close by; run along the outside of the rip, and try to get upon the bank as soon as practicable.

In summer vessels frequently drift about the entrance for days, without a breadth of wind, and in very strong currents.

Tides.—The corrected establishment or mean interval between the time of the moon's transit and the time of high water is III*h.* XLIX*m.* The mean rise and fall of tides is 4.6 feet, of spring tides 5.5 feet, and of neap tides 4.0 feet. The mean duration of the flood is 6*h.* 34*m.*, and of the ebb 5*h.* 52*m.* The mean difference between the corrected establishments of the a. m. and p. m. tides of the same day is 2*h.* 22*m.* for high water, and 0*h.* 35*m.* for low water. When the moon's declination is greatest these differences are 4*h.* 38*m.* and 0*h.* 27*m.*, respectively; and when the moon's declination is zero they are 0*h.* 40*m.* and 0*h.* 29*m.* The mean difference in height of these two tides is 1.1 foot for the high waters, and 4.6 feet for the low waters; when the moon's declination is the greatest, they are 0.6 foot and 7.3 feet, and when the moon's declination is zero 1.4 foot and 1.4 foot. When the moon's declination is greatest, and north, the two high waters of the day follow the moon's upper transit, respectively, by about 6*h.* 8*m.* and 13*h.* 56*m.*, and when greatest, and south, by about 1*h.* 30*m.* and 18*h.* 34*m.*, the height of the two being about equal. When the moon's declination is zero, and passing from north to south, they follow the moon's transit by about 4*h.* 9*m.* and 15*h.* 55*m.*, and the first rises about 1.4 foot higher than the second. When the moon's declination is zero, and passing from south to north, they follow the moon's transit by about 3*h.* 29*m.* and 16*h.* 35*m.*, and the second rises higher than the first by the same quantity. When the moon's declination is greatest, north or south, the two low waters follow the moon's transit by about 9*h.* 41*m.* and 22*h.* 7*m.*, but when north the second falls lower than the first by about 7.3 feet, and when south the first falls lower by that quantity. When the moon's declination is zero, the two low waters fall nearly equally. The greatest difference observed between the heights of the two low waters of a day was 8.6 feet, and the greatest difference between the higher high and the lower low water of a day was 10.1 feet.

For the method of computing the times and heights of high and low waters see the example given for San Francisco, and use the tables for Port Townshend, at the end of the Directory.

The geographical position of the triangulation station of the Coast Survey, upon Point Wilson, is:

	° ′ ″	
Latitude	48 08 42.7	north.
Longitude	122 44 49.4	west.
	h. *m.* *s.*	
Or, in time	8 10 59.6.	

* Named by Vancouver in 1792. On one edition of the maps of the United States Exploring Expedition the latter point is called Point Carroll, and on another Point Ringgold.

† Named by the U. S. Exploring Expedition, 1841.

The position of the triangulation station on the extremity of Point Hudson, computed from the secondary astronomical station near the town, is:

	° ′ ″	
Latitude	48 07 06.7	north.
Longitude	122 44 25.8	west.
	h. m. s.	
Or, in time	8 10 57.7.	

Magnetic variation 21° 40′ east, in August, 1856, with a yearly increase of 1.′

From the above it will be seen that Point Hudson is about 1*m.* 25*s.* west of Telegraph hill, San Francisco.

The town of Port Townshend has increased very much since the discovery of gold on Fraser river. No fresh water is to be had, but vessels can obtain a small supply near the military post. Some fine farms, lie near the town, and vegetables are plenty at reasonable prices. The place was noted for the rough character of its "beach combers."

A military post has been established on the bluff, 2½ miles S. by W. from the town, and on a site which commands one of the most beautiful views in these waters, having the bluff and varied shores of the bay on either hand; Admiralty Head, 6 miles distant, in the middle ground; several distant, wooded ridges, and in the back ground the snow-covered, double summit of Mount Baker, 10,900 feet in height, with the mouth of the crater distinctly visible between the peaks, and at times emitting vast volumes of smoke. The elevation of the line of perpetual snow upon this mountain is 3,145 feet. Humboldt is wrong in his description.

On the east side of the bay, abreast of the town, lies a long sand spit, nearly closing the north entrance to *Kilisut harbor,* which runs parallel to the inlet, and is separated by an island a mile wide and 6 miles long. At high tide this harbor communicates, by a crooked boat channel, with Oak cove, at the south end.

At the head of Port Townshend is a narrow channel opening into a large flat, bounded by a low, sandy beach, separating it from Oak cove. The Indians frequently use this as a portage.

The shores are generally bluffs, about 120 feet high, and covered with wood, except behind the town. Between the town and Fort Townshend are two low pieces of grass and sand beach, backed by marsh and ponds. The 5-fathom curve extends but a few hundred yards from any part of the shores. A small patch of kelp lies off the southern point of Prairie Bluff, and another off the north face of Marrowstone Bluff.

Port Townshend was surveyed and first made known in 1792, by Vancouver, who gave it the present name, by which it is always known.

A chart of it was published by the Coast Survey in 1858.

In 1855–'56 a law was passed appropriating a sum for building a light-house upon "Red Bluff," but the recommendations of seafaring men had fixed generally upon Point Wilson as the most suitable location. Red Bluff, or Admiralty Head, has the advantage of being seen further up the inlet, but is shut out from Smith's Island light, while Point Wilson commands both it and Dungeness light. Around Point Wilson all the navigation and commerce of the inlet and sound turn, and from it vessels take their departure when going out in foggy or smoky weather. A vessel entering Port Townshend at night could easily know her position with the light on Point Wilson, and could enter it with certainty. Coming out of the inlet and bound into the bay she would have a good course to run by, when the light was opened by Marrowstone Point.

Marrowstone Point is a low sandy point stretching 300 yards eastward from the base of the bluff, and forming an indentation on its southern face, where anchorage may be had in 12 fathoms, with a current or eddy invariably running ebb. Small craft coming out of the inlet with a head wind can easily take advantage of this for 2 or 3 miles above the point.

It received its present name from Vancouver in 1792.

ADMIRALTY HEAD,

Abreast of the entrance to Port Townshend, is a perpendicular cliff 80 feet high, falling on the eastern side to a low, pebbly shore, which runs 2 miles to the E.NE. and strikes the high cliffs on the eastern side of the inlet. Behind this beach is a large lagoon, and off it is Admiralty bay, with hard, sandy bottom, in irregular ridges, and a depth of 15 to 25 fathoms of water. A strong current always makes out of the bay, and it is exposed to the full sweep of southeasters. The current is so strong that a vessel rides to it, and consequently lies in the trough of the sea.

LIGHT-HOUSE ON ADMIRALTY HEAD.

The structure consists of a keeper's dwelling, with a tower rising through the roof at one end; both are painted white, and the iron lantern surmounting the tower is painted red. The height of the tower from the base to the focal plane is 41 feet, and the elevation of the focal plane above the mean level of the inlet is 119 feet.

The illuminating apparatus is of the fourth order of the system of Fresnel, and shows a *fixed white light.* It was first exhibited January 20, 1861, and shows from sunset to sunrise. Under a favorable state of the atmosphere it should be seen—

From a height of 10 feet at a distance of 16.1 miles.
From a height of 20 feet at a distance of 17.6 miles.

Its geographical position, as determined by the Coast Survey, is:

	° ′ ″	
Latitude	48 09 21.6	north.
Longitude	122 40 08	west.

The magnetic variation was 21° 40′ in August, 1856, and the present yearly increase is 1′.

It illuminates an arc of 270° of the horizon, and commands Admiralty inlet and the approaches. It sees New Dungeness light, but Smith's Island light is hidden by Point Partridge.

From Point Wilson it bears NE. by E., distant $3\frac{1}{4}$ miles.

From Marrowstone Point N. by W. $\frac{1}{4}$ W., distant $3\frac{1}{4}$ miles.

From New Dungeness light N. 73° E., distant $17\frac{2}{3}$ miles.

From Point Partridge S. 60° E., distant $5\frac{2}{3}$ miles.

Admiralty Head was named Red Bluff by the United States Exploring Expedition in 1841, but it has now no color to suggest the appellation. Both names are used on the Pacific coast.

Starting from abreast Marrowstone Point the mid-channel course up Admiralty inlet runs SE. by S. $\frac{1}{3}$ S. for 7 miles. The shores on either hand are bluffs of apparently uniform height, covered with trees. About 5 miles on this course is passed, on the eastern shore, a low point, with one or two clumps of trees and bushes, to which has been given the name *Bush Point.** On the western shore is a rounding bluff point one mile north of the point which forms the northeast part of Oak cove. Off this point is good anchorage in 12 or 15 fathoms. The peculiar geological formations found in the vicinity suggested the designation *Nodule Point,** which it now bears. The high bold headland, several miles directly ahead, is Foulweather Bluff,† and that to the E. SE. destitute of trees, except one large clump, which marks it conspicuously from this direction, is *Double Bluff.** The deep indentation between it and Bush Point, with low land in the rear, is *Mutiny bay,** in the northern part of which exists a narrow bank of 11 fathoms, affording an excellent fishing ground. At the end of the course *Oak cove*‡ opens to the westward, and stretches towards the waters of Port Townshend. It has bluff shores nearly all around it, those on the southwest face being limestone; but Basalt Point,§ at the south, derives its name from its geological structure. The depth of water is 5 to 15 fathoms, except N.NW. of Basalt Point, where it reaches 25 and 30 fathoms. The length of the bay is 3 miles, and its average width about $1\frac{1}{2}$ mile. In beating out of the inlet, with a favorable current, vessels must not attempt to work to this bay for the sake of a long tack.

Vancouver named it Oak cove, his people having reported that oak trees stood upon its shores. We have traversed the greater part of the shores but found none.

The opening west of Foulweather bluff is *Hood's Canal.* Vessels bound into it keep close to the western shore of the bluff, and pass two low points lying near together. The water off them is deep. Off the north face of Foulweather, for nearly a mile, less than 15 fathoms may be found. Kelp exists under the face of the bluff, and vessels may pass around it in 6 and 7 fathoms. The bottom along the edge of the kelp is rocky. On the west side of the entrance to Hood's Canal is Port Ludlow, which will be described hereafter.

The next or third course up the inlet is E.SE. for ten miles, passing on the eastward Double bluff, which stretches northeast for a mile, and rises 300 or 400 feet in height, having its top covered with wood. The bluff

* Named by the U. S. Coast Survey in 1855.

† So named by Vancouver in 1792. The Indian name for Foulweather is Pitch-pol.

‡ Named by Vancouver in 1792.

§ Named by the U. S. Coast Survey in 1856.

running also to the northward forms *Useless bay.** This has deep water over the greater portion of it, with a large shallow bay called *Deer lagoon*† at its head. The high bluff forming the southern point of Useless bay is *Satchet head.*‡ A similar bluff lies 2 miles E. by S. of it. These form the southern extremity of Whidbey island, in latitude 47° 54′ north, and are the turning points into Possession sound.

The two heads are about 300 feet high, covered with wood, and separated by a depression, which is in part overflowed at high tide, and then presents the appearance of a small bay. From the eastern head round the western, and a mile toward Useless bay, the low-water line makes out half a mile, the shore being bare where some recent maps have deep water. For nearly a mile south of both heads a depth of 8 and 10 fathoms and smooth sandy bottom can be found. We found, when anchored for several days off the eastern head, a strong under current running into Possession sound, and an upper current setting to the westward, at all tides. Vancouver makes mention of the shoal, and states that beating into the inlet he stood on the bank until he got 5 fathoms, but want of time precluded his examining it.

On the western side of the last mid-channel course we passed Fowlweather bluff, which is perpendicular on its N.NW. face, and about 225 feet high, with heavy firs upon its summit. It slopes towards the east to a bluff 40 feet high, but is steep on the side next to Hood's Canal. The low point 4 miles east of it is *Point No Point,*§ making well out, and destitute of trees or bushes. Between it and Foulweather is a deep bight, and the distance across the neck to Hood's Canal is only a quarter of a mile in one part, marked by the track of a recent tornado that has twisted off and uprooted firs of 3 and 4 feet diameter. On the south side of Point No Point is good anchorage in 10 fathoms; and thence the western shore runs nearly straight SE. by S. for ten miles.

At the end of the last course, which carried us 3 miles beyond Point No Point, the inlet expands to a width of 7 miles. A course E.NE. for 3½ miles carries us to the entrance of Possession sound, the first 6 miles of which run N. ½ W., with a width of 2 miles and bluff shores. It then turns to the northwestward to Port Gardner. The water is deep in the entrance, and affords no anchorage. The low point on the shore, 4 miles after entering, is *Point Elliott,*‖ and the bay opening to the northeast receives the Sinahomis or Seaget river.

The next, or fourth, mid-channel course up the inlet is S.SE. for 21 miles to Allen's bank, which lies a mile off the north end of Vashon's island. Five miles on this course, or seven from Point No Point, brings us to an excellent little harbor on the western side of the inlet, called *Apple Tree cove,** having a low point on the north side, with a soft mud flat extending several hundred yards up the inlet. From 5 to 12 fathoms water and sticky bottom are found off it and in the cove. There is no fresh water in the vicinity, but very good timber may be procured suitable for boat spars and booms. On the eastern shore of the inlet, abreast of this cove, are two low points, a mile apart, making out from the bluff. The indentation between them forms a good though small anchorage, and the chances are good for fresh water at high tide. The southern point is named *Point Wells,** the northern *Point Edmund.** The inlet is here only 3 miles wide, and continues so to *Point Jefferson,** two miles southward of Apple Tree cove. This is a moderately low, straight bluff, with the ground rising behind it, and covered with timber. Stretching broad off its eastern face for three-quarters of a mile we discovered, in 1856, a 9-fathom shoal, which affords capital anchorage for vessels when drifting with light airs and adverse currents.

PORTS MADISON AND ORCHARD.

Point Jefferson is the northern side of the entrance to this port, which runs 3 miles W.SW., with an average width of 2 miles and a large depth of water, except under Point Jefferson, where anchorage may be had in 10 and 15 fathoms, hard sandy bottom, with patches of kelp inshore.

The southeast point of the entrance is low and sandy, making out from high wooded ground. One mile west of it is the narrow entrance to a natural canal, upon which, in full view, are situated the Port Madison

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* Named by the U. S. Exploring Expedition, 1841.

† Discovered and named by the U. S. Coast Survey, 1856.

‡ Named by the U. S. Exploring Expedition, 1841. The proper spelling is Skadg′-it, and the Indian name of the point, Skoolhks.

§ Named by U. S. Exploring Expedition, 1841. The Indian name for the point is Hahd-skus.

‖ Named by U. S. Exploring Expedition, 1841.

saw-mills. At the SW. part of the bay is the very narrow entrance to *Port Orchard.* The channel is somewhat crooked, but it has 3 and 4 fathoms water in it. On the western side of this entrance are some white patches of beach, formed by clam shells. In 1857 an Indian village was situated here, and an Indian sub-agency. Both sides of the entrance are bluffs. Vessels not well acquainted with the channel must enter under easy sail, and keep a lead going on each side of the vessel to ascertain where the deepest water lies. After getting through give the point, one mile off on the western side, a berth of nearly half a mile, to avoid a shoal which makes out east from it. Thence it is plain sailing in 15 to 25 fathoms of water. After passing the first point an arm opens to the NW., and many vessels load there with spars. Ten miles up the southern channel is, or was, a saw-mill. In coming out of this port vessels should not trust the southern entrance, but leave as they entered. See remarks under heading Restoration Point, page 143.

Port Orchard was examined and named by Vancouver in 1792.

Port Madison was named by the United States Exploring Expedition in 1841. The Indian name is Noo-soh'-kum.

Bainbridge island lies between Port Orchard, Port Madison, and Admiralty inlet. It is 8 or 9 miles long by 2½ in breadth, and its general direction is SE. by S. A few loggers' huts stand on the western side and the Madison saw-mill at the north end. On the SE. part it is indented by two small harbors. It was named by the United States Exploring Expedition in 1841.

DUWAMISH BAY.

Abreast of Port Madison the eastern shore of the inlet retreats and there receives several small streams of water, but it gradually makes out into a very long, low sand point, called *West Point,** which forms the extreme northwest part of the entrance to Duwamish bay. The bay runs E. by S. 6½ miles and has a width of 2 miles. To the south point, called *Battery Point,*† which is low and bare, with a curiously shaped mound rising sharply behind it, the course is about SE. by S., and distance 4½ miles. Under West Point there is anchorage in 10 to 15 fathoms after getting towards the bluff; but on the north side of the point the water is very deep. Through the centre of the bay the depth ranges from 88 to 40 fathoms. On the north side of Battery Point a vessel anchoring in 20 fathoms cannot have a greater scope of chain than 35 fathoms without being too close to the shore. When we anchored there in 13 fathoms and veered to 25 fathoms of chain the vessel's stern was in 2½ fathoms. The beach is smooth and very regular, being composed of sand and gravel. On this side of Battery Point is the deserted town of Alki, (the Indian phrase for "by and by.") The town has had several names, but there is nothing about it to command trade.

The bluff head within the bay, 2 miles N.NE. of Battery Point, is Duwamish Head.‡ It is steep, about 150 feet high, covered with timber, and the beach at low water stretches out over a quarter of a mile N.NW. from it. The head of the bay receives the Duwamish river, and for one or two miles is an extensive flat, bare at low water.

The town of Seattle is on a small point at the NE. part of the bay, a little over 5 miles inside of West Point. It consists of a few houses and stores, a church, and a small saw-mill; and a number of university buildings are to be erected, (1862.) It has but little trade.

Seattle has been proposed as the terminus of the northern trans-continental railroad, penetrating the Cascade mountains by the Yakima Pass, and thereby making the line 140 miles shorter than by the Columbia River Pass, which is remarkably favorable, whilst the former is only possibly practicable.

The usual anchorage is directly off the wharf in 10 to 15 fathoms water, with the large white house on the extreme point bearing about E. or E. by S. and at a distance from the beach about 500 yards. This position will enable a vessel to work out well by making the first tack to the southward towards the flat. If it be high water this flat cannot be distinguished, and the lead must be kept going. When a depth of 15 fathoms is struck go about, for it shoals to 3 fathoms very suddenly, and keeping on would soon bring up a vessel on the flat. If the current be ebb, vessels bound out should stand well into the inlet; and if bound up, work close under and around Duwamish Head to Battery Point. If the current be flood, vessels bound out should work under the north shore, and close to West Point; if bound up, work under the north shore about 3½ miles to Magnolia bluff, beyond a low marshy indentation in the shore, or until they can fetch well clear of Battery Point.

There is said to be some good agricultural prairie land on the Duwamish river. Some distance up it is

* Named by the U. S. Exploring Expedition, 1841.

† Named by the U. S. Coast Survey, 1856. The Indian name is Me-kwah-mooks.

‡ Named by the U. S. Coast Survey, 1856.

connected with *Lake Washington*, which is reported to be 25 miles long and several miles broad, with islands in it. It is but a few miles in a direct line east of Seattle. Another small lake exists about a mile back from the beach, a mile west of Seattle. This is reached by a trail.

The town of Seattle was attacked by a small body of Indians in 1855, but the assault was repelled by the United States steamer Massachusetts.

The bay was called Elliott's bay by the United States Exploring Expedition in 1841, but the present name is that by which it is invariably known, and was adopted from the name of the tribe of Indians inhabiting its shores. The name of the town is derived from that of the chief, Se-at-tlh.

The Coast Survey report for 1854 was accompanied by a reconnaissance sketch of Duwamish bay and Seattle harbor.

RESTORATION POINT.

From the SE. point of Port Madison to this point the shore is bluff and somewhat irregular, and is indented first by *Eagle harbor*,* having a long pebbly spit making out 300 or 400 yards SE. from its north point; and next, at Point Restoration, by *Blakely harbor*,* having off its entrance a large rock, 15 feet high, with deep water all round it. The rock bears nearly N.NW. three-quarters of a mile from the point, and the bottom between is irregular, the depth ranging from 20 to 40 fathoms. Blakely harbor is only a quarter of a mile wide and three-quarters long, with 18 fathoms sticky bottom at its mouth, and shoaling gradually inside, but most on the south side. A hydrographic sketch of the harbor will be found in the Coast Survey Report for 1856.

Eagle harbor is larger and more commodious than Blakely. We discovered the shoal off its north point in 1856.

Restoration Point is in some respects very peculiar; no other in these waters, except Battery Point, presenting the same formation. For 300 yards it is flat, about 10 feet above high water, and has a foot depth of soil covered with grass over a limestone rock, upheaved nearly on edge, the direction of the strata pointing toward Battery or a little south of it. Inshore it rises up sharply about 100 feet, its sides covered with grass and the summit with fir trees. Around the whole SE. face of the point these peculiarities exist. On the upper levels of the high land adjacent our party found small lakes of water.

From the extremity of the point a ledge, bare at low tides, makes out 300 yards, but the depth is 6 fathoms 100 yards off its extremity, and 16 fathoms at a quarter of a mile. On the tail of this ledge the United States sloop-of-war Decatur struck in 1855. S.SE. of the point anchorage may be had in 15 fathoms, sticky bottom, a quarter of a mile distant; or, as a rule for finding anchorage, bring the rock north of it to range just over and inside of the point. Kelp exists along the southern face.

The geographical position of the triangulation station of the Coast Survey upon this point is:

	° ′ ″
Latitude	47 35 05.8 north.
Longitude	122 28 15.2 west.
	h. m. s.
Or, in time	8 09 53.0.

From this point Battery Point bears E. by N. ½ N., distant 2½ miles.

Tides.—The approximate corrected establishment is IV*h.* IV*m.*, and the approximate mean rise and fall of tides 7.4 feet.

Vancouver anchored under this point in 1792; found large numbers of Indians located near, and first called it Village Point, but changed it to its present name in commemoration of the day on which he anchored. From this place his boats explored all the waters adjacent.

South of Restoration the inlet opens to the westward for a couple of miles into a bay, in which is situated an island about three-quarters of a mile in extent, called *Blake island*.* From the northwest part of the bay leads a narrow crooked pass 3 miles long to the southern part of Port Orchard, which spreads out into several arms. The pass is obstructed by rocks and is difficult of navigation. The winds are variable, light, and uncertain at its narrowest part, where it makes a sharp turn, and is only a couple of hundred yards wide, with a rushing swirling current. The channel generally used, although narrower than the one just mentioned, is that leading into Port Madison.

* Named by the United States Exploring Expedition, 1841.

Our last course brought us to *Allen's bank*,* off the north end of Vashon's island, with Blake island to the westward, and three-quarters of a mile distant. This bank is nearly a mile in extent, and has as little as 10 fathoms upon it, with a variable bottom, in some places mud, and in others hard sand. At our anchorage upon it in 11 fathoms the south end of Blake island bore N. 81° W., and the NW. point of Vashon's island S. 5° E. Between the anchorage and Blake island the water regularly deepens to about 18 fathoms in soft mud. This anchorage has already proved of service to vessels losing the wind and having adverse currents. In some recent maps 25 to 30 fathoms are marked in the position of this shoal. The eastern point of Blake island is low and pebbly, and called by the natives Tatugh. Under it is anchorage in 17 and 18 fathoms, soft mud. The northeast point of Vashon's island is Dolphin Point,† the northwest point Point Vashon,‡ the point abreast of it is Point Southworth,‡ and the mile-wide channel, commencing between the last two points, is *Colvos passage*,‡ running west of Vashon's island.

The extent of shore-line from the entrance of Admiralty inlet to the north end of Vashon's island is 241 miles.

The main body of the inlet continues about SE. for 8 miles, then S.SW. 8 miles further, with an average width of 2 miles. In this stretch the currents are moderately strong, the chances for anchoring few, and it is sometimes calm while a fine breeze is blowing through Colvos Passage.

Brace Point§ lies on the east side of the inlet, NE. from Dolphin Point. The round-topped point having two or three lone fir trees upon it, and situated on the same side of the inlet, 4 miles above Brace Point, is called *Point Pully*.‡ The water is very deep close to it on either side.

The geographical position of the triangulation station of the Coast Survey on the summit of the mound at Point Pully is:

	° ′ ″
Latitude	47 27 07.3 north.
Longitude	122 22 21.5 west.
	h. m. s.
Or, in time	8 09 29.4.

There is a small bight north of Brace Point, and between it and another low point, called *Fauntleroy cove*,† having good anchorage in 10 and 12 fathoms, and fresh water is easily obtained in the vicinity. Between Brace Point and Point Pully two or three small streams of water empty, and another from the valley a mile east of the high bluff at Pully. Off this valley a flat makes out with deep water at its edge.

Under Dolphin Point there is very deep water; but off the north end of the island, near this point, we found anchorage in 14 fathoms, hard bottom.

Colvos passage is the usual, we may say the invariably used ship channel towards Puget's sound. It is about a mile wide, with high bluff shores, varied by numerous small, low, sand points making out from the face of the bluff, and having deep water off them. The passage is 11 miles long to the south end of Vashon's island, which is called Dalco Point,‡ and it runs with a nearly straight course S. by E. A mile and a half inside of Point Vashon there is a small curve in the shore line called *Fern cove*,† with excellent anchorage in 5 and 10 fathoms. Abreast of Dalco Point on the western shore there is a small harbor, with a narrow and shoal entrance, called *Gig harbor*.‡ Looking out of the passage to the north, Mount Baker shows distinctly in clear weather.

COMMENCEMENT BAY.

When abreast of Dalco Point this bay, at the termination of Admiralty inlet, opens to the E.SE., and over its low background shows the high snow-covered peak of Mount Rainier. The general direction of the bay is E. by S. ½ S., with a length of three or four miles, a width of two miles, and a great depth of water up to the line of the extensive flat at its head, which is backed by marsh. There are no settlements upon it, but in 1857 we found some deserted fishing stations.

It was named in 1792 by Vancouver, who thought this the entrance to some large arm of the inlet, on account of the low country beyond.

We believe the Indian name for this bay is Puyallup.

* Discovered and named by the United States Coast Survey in 1857.
† Named by the United States Coast Survey, 1857.
‡ Named by the United States Exploring Expedition, 1841.
§ Named by the United States Coast Survey in 1856.

Vashon's island, lying between the southern extremity of the inlet and Colvos passage, is 11½ miles long, with an average width of 2½ miles. Half-way down on its eastern side lies a curiously shaped peninsula, formed by a narrow, low, sandy neck of land, which makes out into the inlet, and then runs towards the south point of the island. The space between this peninsula and the island is an excellent harbor four or five miles long, and three-quarters of a mile wide, with five to ten fathoms water in it. The southeast face of the peninsula is high and steep, and bordered by water from 40 to 50 fathoms deep.

The island is high, with steep shores, covered with wood and undergrowth. Its surface is marshy in many parts that are quite elevated. The present name was given by Vancouver in 1792. The harbor formed by it and the peninsula was called *Quartermaster's harbor* by the United States Exploring Expedition in 1841.

POINT DEFIANCE AND THE NARROWS.*

The high, sharp yellow bluff facing the south entrance to Colvos passage is called Point Defiance, and between it and the western shore pass all the waters of Puget's sound. This passage is called the Narrows. Its average width is three-quarters of a mile, and very uniform; the shores are high, bold, and in some places rocky. For two miles to the SE. its course is a regular curve. The next turn is to the southward, and at a distance of two miles in that direction the waters of the sound open ahead, with a narrow pass between the main and Fox island to the west; and a small indentation, backed by low ground, and formed on the south by a small peninsula, on the east. In this bight is anchorage in 15 fathoms, with swirling eddies. On the south face of this peninsula, and outside of the kelp, anchorage may also be had.

PUGET'S SOUND.

This collection of inlets commences after passing "The Narrows," and covers an area of 14 miles by 22, with a general direction SW. ¾ S. The aggregate shore-line of this sound, and the adjacent part of Admiralty inlet, with Colvos passage, to the north end of Vashon's island, is not less than 370 miles. Upon its shores are situated the settlements of Steilacoom, Nisqually, Olympia, and Newmarket.

It received its present name in 1792 from Vancouver, in compliment to Lieutenant Puget, who explored it.

STEILACOOM.

On the eastern shore of Puget's sound, nine miles south of Point Defiance, is situated the town or village of Steilacoom, upon a rising bluff. It consists of only a few houses. Fort Steilacoom stands about a mile inland, upon a piece of gravelly prairie, and roads lead from it to the town and the creek.

The neighboring country is only moderately well adapted to agriculture except along the bottoms of the small streams.

The usual anchorage is off the small wharf, in 15 fathoms, hard bottom, and about 400 or 500 yards from the shore. An island lying 2¼ miles distant to the west of that position is called McNeil, and between it and Fox island, to the northward, there is a passage a mile and a half wide. The passage on the south side of McNeil island, between it and Anderson island, is generally known as Balch's passage. It bears about SW. by W. from the anchorage, and is marked by a small wooded islet in it, called Eagle island, off which lies rocky bottom, and vessels keep closer to the north shore. This passage is the direct channel to Olympia, instead of following the broad one to the southward of Steilacoom.

The north end of the island, showing to the southward, and 1½ mile from the anchorage, is Kitson island.

One mile north of the anchorage is the mouth of a small stream called the Steilacoom river.

In coming to Steilacoom, or bound direct for Olympia, a patch of kelp, with foul bottom and less than three fathoms of water upon it, must be avoided. It bears S.SE. one mile from the south end of Fox island, and NW. by W. 1¾ mile from Steilacoom wharf. The tide-rip upon it and abreast of the town is very great; quite sufficient with a little wind to swamp a small boat. The shores of the main and islands are bold, nearly uniform in height, and covered with trees.

Tides.—The corrected establishment or mean interval between the time of the moon's transit and the time of high water is IV*h*. XLVI*m*. The mean rise and fall of tides is 9.2 feet, of spring tides 11.1 feet, of

* Named by the United States Exploring Expedition in 1841.

neap tides 7.2 feet. The mean duration of the flood is 6*h.* 3*m.*, of the ebb 6*h.* 25*m.*, and of the stand 28*m.* The difference between the rise of the highest tide and the fall of the lowest tide observed was 18.3 feet. The greatest difference observed between the height of the two low waters of one day was 12.2 feet, and the greatest difference between the higher high and lower low waters of a day was 17.7.

When the moon's declination is greatest north the two high waters of the day follow her transit, respectively, by about 6 and 16 hours, and when greatest, and south, by 3½ and 18½ hours, the height of the two being about equal. When the moon's declination is zero they follow the moon's transit by about 4*h.* 46*m.* and 17*h.* 12*m.*, but the first is higher than the second by about 2.7 feet when the moon's declination is changing from north to south, and when changing from south to north the second is higher than the first by that quantity. When the moon's declination is greatest, north or south, the two low waters follow the moon's transit by about 11*h.* 11*m.* and 23*h.* 37*m.*, but when north the second falls lower than the first by about 9.7 feet, and when south the first falls lower than the second by that quantity. When the moon's declination is zero the two low waters are nearly equal in height; when changing from north to south they follow the moon's southing by about 11*h.* 41*m.* and 23*h.* 7*m.*, and when changing from south to north by 10*h.* 41*m.* and 24*h.* 7*m.*

To find the times of high and low waters, first compute them for Port Townshend, and to the numbers thus obtained add 57 minutes.

The pronunciation of the name Steilacoom, as given to us by Indians, is Tchil'-æ-cum. On the Admiralty maps of 1847 we find it Chelakoom.

A reconnaissance sheet of Steilacoom harbor was published by the Coast Survey in 1856.

Nisqually, five miles south of Steilacoom, and on the same side of the sound, is, at present, a place of no trade or importance. It was one of the early posts of the Hudson Bay Company, and is still occupied by them. An extensive mud flat exists off the mouth of the wide, marshy valley, but the depth of water is very great close to it, and the anchorage room very much contracted. The river Nisqually empties here, and we believe there are two small saw-mills upon it. The name is Indian.

OLYMPIA.

It would be almost useless to attempt to describe the route to Olympia from Steilacoom, as a pilot or a map is absolutely necessary in making the passage. The mid-channel course is 21 miles in length, and its width from half a mile to a mile and a half.

Olympia is situated at the head of Budd's inlet,* which is six miles long, three-quarters of a mile wide, and runs nearly south. The shores are steep and wooded, and the head of the bay an immense mud flat behind which is the town. It acquires prospective importance by being the capital of the Territory, but especially on account of its proximity to the Columbia river valley, and to the headwaters of the Chehalis. There is a saw-mill at Newmarket, two miles south on the Tumwater, and three others in the vicinity, besides one or two grist-mills.

A depth of three fathoms can be carried on the west side of Budd's inlet, within one and a half mile of the wharf; and one fathom within a mile on the eastern side. Vessels are brought up to the wharf at the highest tides, and then rest in the mud until ready to leave.

The greatest difference between the highest and lowest tides is reported about 24 feet, and is doubtless more than this when we compare its position with that of Steilacoom. The approximate corrected establishment is V*h.* VIII*m.*, and the mean rise and fall of tides 9.2 feet.

The approximate geographical position of the wharf is:

	° ′ ″
Latitude	47 03 00 north.
Longitude	122 55 00 west.
	h. m. s.
Or, in time	8 11 42.

The computed magnetic variation 20° 47′ east, in July, 1856, and the present yearly increase 1′.

A hydrographic reconnaissance of Budd's inlet was published by the Coast Survey in 1856.

A small saw-mill has been built on Hammersley's inlet,* and another on Henderson's inlet.*

* Named by the U. S. Exploring Expedition in 1841.

HOOD'S CANAL.*

The entrance to this arm of Admiralty inlet lies between Basalt Point and Foulweather bluff, the latter bearing E. ¾ S., distant 3⅛ miles from the former.

The first mid-channel course is SE. for four miles, pointing directly into Port Gamble, at the entrance to which the houses and mill are plainly visible; and passing a high, round, wooded peninsula on the west side of the channel, and connected to the main by a narrow neck of low sand beach. This is frequently mistaken for an island, and is called Hood's Head.† Between this head and Port Gamble the canal changes its course and runs in nearly a straight line S. by W. 40 miles, with an average width of 1½ mile. In latitude 47° 21′ N. it makes an abrupt turn, and runs for 12 or 13 miles about NE.

PORT LUDLOW.

Close to Basalt Point lie some rocks, with others about half a mile SE., called the Colvos rocks,* among which is one 25 feet high, but of small extent. Close in shore, and abreast of this, is a rock just awash at high tide, but between the two runs a channel with 15 fathoms water, having soft, muddy bottom. The bright bluff head 1¼ mile SE. of the Colvos rocks, and about two miles SW. by W. from Foulweather bluff, is *Tala Point.*‡ Half-way between the Colvos and this point is the usual entrance, over a sand bar having 4½ fathoms. The 3-fathom line stretches half a mile SE. of Colvos. If the wind and currents do not suit for this channel, run inside of the Colvos, carrying deep water and eight fathoms, soft, muddy bottom, anywhere inside of Tala Point, even past the saw-mill, if necessary. The general direction of the shore from Basalt Point to the saw-mill on the low sand point inside, is S. SE. 2½ miles. Abreast of Tala the width of the bay is three-quarters of a mile, but it gradually contracts to less than half a mile at the saw mill, at which vessels load. Inside of the saw-mill point is an excellent anchorage in seven and eight fathoms. About a mile from the mill is an ample water-power, with an available head of 80 feet, but it is not used.

We believe the Pacific Mail Steamship Company were to have established a coal depot here for their Puget's sound steamships; but since the breaking out of the Fraser river gold excitement other arrangements have been made.

Of all the small harbors in these waters we do not hesitate to give this the preference, as it is completely land-locked, and protected from gales from every quarter by the high land and high trees around it. The first steamboat built in these waters was launched here in 1860.

It received its present name from the United States Exploring Expedition in 1841.

The first rocks off Basalt lie at the narrow mouth of a small boat harbor, called Mats-mats. The entrance to it is over a half mile long, about 100 yards wide, and at the sharp turn obstructed by rocks, which allow a channel of only three feet water. Inside, the depth ranges to two fathoms, and the extent of the harbor is about three-quarters of a mile by a third in breadth.

A map of Port Ludlow and Mat-mats was published by the Coast Survey in 1856.

PORT GAMBLE.

After passing Foulweather bluff keep closer to the eastern shore than to the western, to avoid the strong current passing round the low point which makes out from Hood's Head. Run for the saw-mill, plainly in sight, on the western side of the entrance to the bay, and when within a mile of it approach the eastern bluff within the third of a mile, in about 10 or 15 fathoms, gradually drawing closer in shore, and passing between the outer white and inner black can buoys. At the lowest tides the white one is in 15 feet, the black in 12½, and the small spar buoy between them in mid-channel in 17 feet, but it rarely shows above water at any tide. After passing these buoys the mill bears almost S.SE. half a mile distant. Steer SE., or half-way between the mill wharf and the east point, pass to the east of the white spar buoy, which is in 12½ feet, and run through the entrance, passing the wharf at about one-third of the distance between the points. Do not round up to the eastward, as a shoal makes out almost parallel with the point. It may be here noticed that these buoys were made and placed by the Puget Mill Company, for the benefit of vessels trading to the port.

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* Named by Vancouver, 1792.

† Named by the U. S. Coast Survey in 1856.

‡ Named by the U. S. Exploring Expedition in 1841.

If the wind is ahead while beating up, it will be impossible for a large sized-vessel to get in, as the channel is half a mile long, and not over 100 yards wide at the narrowest part. Anchor off the buoys, and drop in with the early flood, or warp in with the last of the ebb. On the shoal forming the western side of the passage ten feet may be found until up with the white spar buoy.

Inside of the points the bay appears to open well under the eastern one, but the 3-fathom line makes out on a line with the end of the point. On the western side is a crib, around which a shoal has formed—anchor just beyond it in five fathoms, soft muddy bottom. The depth of water throughout the bay is from four to nine fathoms, with mud bottom. The length of the bay is 2¼ miles, its width three-quarters of a mile, and its direction southeast. The shores are steep, but not high, and are bordered by sand and pebble beach, offering capital chances for laying a vessel out. A better place, however, for that purpose, is at the end of the store wharf, especially for vessels with large dead rise.

In summer the wind generally blows into the harbor lightly; in winter the SE. gales draw directly out. Loaded vessels must warp out in summer, or trust to a light southerly air in the morning, with an ebb tide. None but small, smart working vessels can beat out, and few of those have done so within the channel limits.

The approximate geographical position of the eastern point of the entrance is:

	°	′	″	
Latitude	47	51	32	north.
Longitude	122	33	56	west.
	h.	*m.*	*s.*	
Or, in time	8	10	15.7	

The saw-mill here is the largest and most effective in this part of the Territory, cutting at the rate of six or seven millions of feet of lumber per year. Attached to it are lath, shingle, and planing machines. A large quantity of the lumber and rough spars for masts are carried to Australia and the Sandwich Islands. Within two or three seasons, ending with that of 1857, the number of outward-bound vessels trading to the Sandwich Islands was 15; the average passage 26½ days; the shortest passage 19 days, and the longest 32. From the islands to the mill the number of vessels arriving was 16; average passage 25½ days; shortest passage 15 days, and the longest 35 days. Of these one reported a passage of 15 days to the mouth of Fuca strait, and nine days thence to the port, in the early part of September, having encountered nearly continuous calms in the strait and inlet.

From this place, called Teekalet, (the Indian name of the bay,) a road is being constructed (1857) by the Mill Company to Port Madison.

The steam and smoke from the saw-mill are distinctly visible from part of Port Townshend over the low ground between that bay and Oak cove.

It received its present name from the U. S. Exploring Expedition in 1841.

The Coast Survey Report for 1856 contained a hydrographic sketch of Port Gamble.

Three miles from Hood's Head, on the western side of the canal, *Suquamish harbor** opens. A large sand bank occupies its centre, and extends a mile in length N.NW., by half a mile in width. The approaches to the shoal, which is in part bare, are detected in thick weather by the lead, the soundings decreasing regularly from 20 fathoms. Keep, however, close under the northern shore, which runs two miles W.SW. from the low point called Termination Point.*

Fourteen miles from Hood's Head the canal curves more to the southward, and then to the S.SW. around Hazel Point,† on the west side of which a large arm of the canal makes north for ten miles, bifurcating near its head. On its western side the eastern spurs of the Olympus range reach its waters, and form the western shore-line of the canal to the great bend. The sharp peak named Mount Constance‡ attains an elevation of 7,777 feet.

Two miles south of Hazel Point, and on the eastern side of the canal, is a fine harbor, formerly called *Hahainish harbor*,* but the name has been changed by settlers, who have lately built a small saw-mill there. It is formed by Seabock island on the west, and is about a mile long by half a mile wide, with good bottom in from 10 to 15 fathoms, the depth decreasing to the head.

South of the harbor Hood's canal is slightly contracted in width, but continues in the same general direction to about latitude 47° 21′ N., ("Vancouver's farthest,") where it takes an abrupt turn, and stretches E. by N. ½ N. four miles. The width in that part contracts to half a mile, and the shores overlap. From this it takes another slight bend, runs NE. by N. eight or nine miles, and reaches within two or three miles of the

* Named by the U. S. Exploring Expedition in 1841.

† Named by Vancouver in 1792.

‡ Named by the U. S. Coast Survey in 1855.

northern extremity of Case inlet,* an arm of Puget's sound. A large lake lies between the inlet and the canal. When Vancouver reached the first sharp turn he thought he saw the termination of the canal, and has plotted it in accordance with that view on his chart, four miles beyond the point marked "Vancouver's farthest" on the Admiralty charts. This was, in fact, the highest point to which he carried his boats.

The name, Hood's Canal, was given to it in 1792 by Vancouver. Its extent of shore-line is not less than 192 miles.

Before quitting our undertaking we are induced to append the following meteorological table, as it will give a good idea of the summer climate in this section. The observations were made upon a vessel in the waters of Fuca strait, Admiralty inlet, and Puget's sound, the instruments being kept in the best shade practicable. The barometer was an aneroid, read at the hours 10 a. m. and 4 p. m., except in heavy weather, when it was read every hour. The thermometer readings are Fahrenheit, and reduced to the standard.

Abstract of meteorological observations made on board the United States Coast Surveying brig R. H. Fauntleroy, in the Strait of Juan de Fuca, Archipelago de Haro, Admiralty Inlet, and Puget's Sound, during the summers of 1855, '56, *and* '57.

1855.	Means of daily maxima.	Means of daily minima.	Highest readings, maxima.	Range of maxima.	Lowest readings, minima.	Range of minima.	Greatest range of temperature in one day.	Range of barometer.	Rain.
	°	°	°	°	°	°	°	*Inches.*	*Inches.*
July	71.5	53.3	90.9	29.9	48.2	9.4	33.7	0.44	Not measured.
August	70.2	53.4	83.3	24.7	49.8	6.6	29.7	.43	
September	65.8	52.5	77.7	18.3	49.3	8.6	20.0	.91	
Three weeks in October	63.2	52.2	76.7	20.2	45.3	11.9	27.6	.38	

Greatest range of temperature during the above period, 45°.6.
Greatest range of barometer from June 24 to October 18, = 0.92 inch.
A dry season; heavy SE. gales in September.

1856.	Means of daily maxima.	Means of daily minima.	Highest readings, maxima.	Range of maxima.	Lowest readings, minima.	Range of minima.	Greatest range of temperature in one day.	Range of barometer.	Rain.
	°	°	°	°	°	°	°	*Inches.*	*Inches.*
May	67.1	48.7	85.7	31.1	45.0	7.4	38.1	0.53	Not measured.
June	69.0	51.2	84.4	27.4	45.7	10.3	34.0	.53	
July	72.5	51.7	84.7	29 7	43.4	14.0	41.3	.43	
August	72.2	53.5	83.7	25.5	48.4	10.2	30.2	.56	
September	72.8	51.1	85.1	27.5	42.0	14.4	36.5	.69	

Greatest range of temperature during the above period, 43°.7.
Greatest range of barometer from April 25 to September 30, 0.85 inch.
A wet season.

* Named by the United States Exploring Expedition, 1841.

1857.	Means of daily maxima.	Means of daily minima.	Highest readings, maxima.	Range of maxima.	Lowest readings, minima.	Range of minima.	Greatest range of temperature in one day.	Range of barometer.	Rain.
	°	°	°	°	°	°	°	*Inches.*	*Inches.*
Three weeks in May	71.7	48.4	101.5	46.9	38.5	18.1	46.0	0.52	0.79
June	78.2	50.7	90.1	29.2	43.0	13.1	36.9	.62	1.19
July	74.9	51.6	89.2	26.5	46.9	9.3	33.1	.44	0.01
August	73.8	51.1	88.0	28.0	47.1	9.7	37.8	.46	0.08
September	65.5	49.8	76.4	23.3	45.2	8.5	30.8	.73	0.70
Two weeks in October	60.1	48.9	68.7	16.3	43.4	7.8	25.1	.65	0.74

Greatest range of temperature during the above period, 63°.0.

Greatest range of barometer from May 12 to October 13, 0.79 inch.

A dry season, and marked by a week of remarkably hot weather at the close of May and beginning of June.

The working season of 1858 was wet. The working season of 1859 was dry.

The following table will give a few additional items of the winter months of 1860–'61. The observations were made at Olympia, at the office of the surveyor general.

	1860. December.	1861. January.	1861. February.
Maximum temperature	52°	49°	52°
Minimum temperature	23°	14°	31°
Mean temperature	39°.7	38°.4	42°.3
Amount of snow in inches	No record	6.4	9
Amount of rain and melted snow in inches	do	3.1	8.9
Days on which snow fell	do	4	2
Days on which snow lay on the ground	do	8	4
Days on which rain fell	13	12	13
Days on which no rain fell	18	19	15
Number of frosty mornings	11	6	7
Number of clear days	6	4	8

The cerealia generally grow well, but the climate is too cold for maize. During the winter a great amount of rain falls—as much as 60 inches—and heavy weather prevails principally from the southward. It is never cold enough to form thick, clear, solid ice, which has to be brought from Sitka for the San Francisco market.

Table of geographical positions of important headlands, bays, rivers, light-houses, &c., on the western coast.—Compiled from the "Directory for the Pacific Coast of the United States."

EXPLANATION.—Primary astronomical stations in small capitals; secondary astronomical stations designated by the mark 2 A; light-houses and light-house sites in italics, with the order of the light in Roman numerals; F. signifies fixed; Fl., flashing; Var., varied; Rv., revolving; W., white; Rd., red; Nat., natural color; M., minutes; and the Arabic numerals denote the distance at which the light may be seen, under ordinary states of the atmosphere, from a height of twenty feet above the sea.

Number.	Name of station.	Locality.	Latitude north.	Longitude, west. In arc.	Longitude, west. In time.	Magnetic variation, east.	Time of determination.
	CALIFORNIA.		° ′ ″	° ′ ″	h. m. s.	′ ″	
1	LOS CORONADOS, (belonging to Mexico)	The highest part of the largest islet	32 23 46	117 13 21	7 48 53.4	.....	.....
2	Initial point	Monument on the boundary between Mexico and the United States.	32 31 58.5	117 06 11	7 48 24.7	.....	.....
3	*Point Loma light-house*, III—F. W.—29	West side of the entrance to San Diego bay, 450 feet high	32 40 13.0	117 13 17	7 48 53.0	.....	.....
4	SAN DIEGO	Observatory Hill, near La Playa, San Diego bay	32 41 57.9	117 13 22	7 48 53.5	12 29	April, 1851.*
5	San Clemente. 2 A	At the northwest extremity of the island (Santa Barbara channel)	33 02	118 34 00	7 54 16.0	.....	.....
6	Cortes Shoal	Two and a half fathom spot. The Bishop rock (Santa Barbara channel)	32 25¾	119 05	.....	.....	.....
7	San Nicolas. 2 A	At the southeast end of the island (Santa Barbara channel)	33 14 11.6	119 25 00	7 57 40.0	.....	.....
8	Santa Catalina. 2 A	At the great transverse break of the island, (north side) (Santa Barbara channel)	33 26 34.8	118 28 45	7 53 55	.....	.....
9	Santa Barbara island	23 miles W. by S. from the N. end of the Santa Catalina (Santa Barbara channel)	33 30	119 02	.....	.....	.....
10	San Pedro bay. 2 A	Edge of the bluff at the landing (Santa Barbara channel)	33 43 19.6	118 16 03	7 53 04.2	13 30	Nov., 1853.
11	Anacapa	Eastern point of the island (Santa Barbara channel)	33 01	119 19	.....	.....	.....
12	Point Hueneme, proposed *light-house site*	N. side of the eastern entrance to the Santa Barbara channel. (Santa Barbara channel)	34 08	119 09	7 56 36	.....	.....
13	Prisoner's harbor. 2 A	North side of the island of Santa Cruz (Santa Barbara channel)	34 01 09.8	119 40 00	7 58 40.0	.....	.....
14	Cuyler's harbor. 2 A	At the NE. part of the island of San Miguel (Santa Barbara channel)	34 03	120 20 27	8 01 21.8	.....	.....
15	*Santa Barbara light-house.* IV—F. Rd.—12	Two miles southwestward of the landing, 180 feet high (Santa Barbara channel)	34 23 35.4	119 42 05	7 58 48.3	.....	.....
16	Santa Barbara. 2 A	At the landing (Santa Barbara channel)	34 24 24.7	119 40 18	7 58 41.2	.....	.....
17	*Point Concepcion light-house.* I—Rv. W. Fl. ½ M.—23.—Bell	Point Concepcion, 250 feet high (Santa Barbara channel)	34 26 46.6	120 27 00	8 01 48.0	.....	.....
18	POINT CONCEPCION	Valley of El Coxo (Santa Barbara channel)	34 26 56.5	120 25 39	8 01 42.6	13 50	Sept., 1850.
19	Point Arguello	12 miles NW. by W. ½ W. from Point Concepcion	34 34	120 38	.....	.....	.....
20	San Luis Obispo bay. 2 A	At the small gully west of the creek	35 10 37.5	120 43 31	8 02 54.1	14 17	Feb., 1854.
21	San Simeon bay. 2 A	Near the landing	35 38 24.2	121 10 22	8 04 41.5	.....	.....
22	Piedras Blancas	White rocks near San Simeon bay, outer one	35 39	121 15	.....	.....	.....
23	Point Sur	51 miles SE. ½ S. from Point Año Nuevo	36 19	121 52	.....	.....	.....
24	*Point Pinos light-house.* II—F. Nat.—16	At the NW. point of the trees, 91 feet high	36 37 52	121 55 00	8 07 40.0	.....	.....
25	POINT PINOS	SW. point of Monterey bay, near light-house	36 37 59.3	121 54 25	8 07 37.7	14 58	Feb., 1851.
26	Santa Cruz harbor. 2 A	At the Embarcadero, northern part of Monterey bay	36 57 26.9	122 00 10	8 08 00.7	.....	.....
27	Point Año Nuevo, proposed *light-house site*	40 miles SE. by S. from San Francisco bar bell-boat	37 07	122 19	.....	.....	.....
28	Point San Pedro	13 miles S. by E. ½ E. from Boneta light	37 35 45	122 30 34	8 10 02.3	.....	.....
29	*South Farrallon light.* I—Rv. W. Pr. Fl. every M.—27.—Whistle.	23¼ miles SW. by W. ½ W. off entrance to San Francisco bay, 360 ft.	37 41 48.8	122 59 05.2	8 11 56.3	.....	.....
30	*Point Lobos light-house* site	The S. head of entrance to San Francisco bay	37 46 50.5	122 29 39.5	8 09 58.6	.....	.....
31	Rincon Point. 2 A	NW. of South Park, San Francisco city	37 47 07.0	122 22 32	8 09 30.1	.....	.....
32	PRESIDIO	Near the Presidio of San Francisco	37 47 29.8	122 26 15	8 09 45.0	15 27	Feb., 1852.
33	TELEGRAPH HILL	Near the "San Francisco Observatory"	37 47 52.8	122 23 19.4	8 09 33.3	.....	.....
34	Telegraph Hill	Triangulation station, summit of the hill	37 48 00.1	122 23 19.4	8 09 33.3	.....	.....
35	*Fort Point light-house.* V—F. Nat.—12¼.—Bell	S. side of the entrance to San Francisco bay, 53 feet high	37 48 31.0	122 27 37.9	8 09 50.5	.....	.....
36	*Point Bonata light-house.* II—F. Nat—25.—Bell	N. head of the entrance to San Francisco bay 306 feet high	37 49 03.7	122 30 50.3	8 10 03.3	.....	.....

* 12° 32′, September, 1853.

TABLE OF GEOGRAPHICAL POSITIONS, &c.—Continued.

Number.	Name of station.	Locality.	Latitude, north.	Longitude, west. In arc.	Longitude, west. In time.	Magnetic variation, east.	Time of determination.
			° ′ ″	° ′ ″	h. m. s.	′ ″	
37	*Alcatraz Island light.* III—F. Nat.—14. Bell	In the harbor of San Francisco, 162 feet high	37 49 26.6	122 24 18.8	8 09 37.2		
38	Punta de los Reyes. 2 A	At landing on Sir Francis Drake's bay	37 59 35.0	122 57 35.9	8 11 50.4		
39	*Punta de los Reyes light-house* site	On the western head of the point	37 59 39.4	123 00 13.2	8 12 00 9		
40	Bodega. 2 A	Bodega bay, W. end of Sandy Point	38 18 20.4	123 02 17.4	8 12 09.2		
41	Haven's Anchorage. 2 A	On the bluff at the landing	38 47 58.0	123 34 01	8 14 16.0		
42	Mendocino bay. 2 A	On the bluff near the landing	39 18 06.1	123 47 25.6	8 15 09.7		
43	Punta de Arena	NW. extremity of the point	38 57	123 45			
44	Shelter Cove, (Point Delgado.) 2 A	On the bluff near the landing	40 01 13.7	124 03 03	8 16 12.2		
45	Cape Mendocino	Extremity of cape	40 25	124 22			
46	HUMBOLDT	Red Bluff, Humboldt bay	40 44 40.2	124 10 30	8 16 42	17 04	April, 1854.
47	*Humboldt light-house.* IV—F. W.—13¼	On the N. point, one mile from entrance, 53 feet high	40 46 03.6	124 12 21	8 16 49.4		
48	Bucksport. 2 A	Town of Bucksport, Humboldt bay	40 46 37.1	124 10 44	8 16 42.9	17 06	July, 1853.
49	Trinidad. 2 A	Town of Trinidad, Trinidad bay	41 03 20.0	124 08 08	8 16 32.5		
50	*Crescent City light-house.* IV—F. W. Var. by Fl.—15¼	On the extreme W. part of the point, 80 feet high	41 44 34.2	124 11 22	8 16 45.4		
51	Crescent City. 2 A	W. of the town, near Point St. George	41 44 44.0	124 11 14	8 16 44.9		
	OREGON.						
52	Port Orford. 2 A	In the town of Port Orford, near the landing	42 44 28.2	124 28 13	8 17 52.8		
53	PORT ORFORD	On the bluff W. of the town	42 44 21.7	124 28 47	8 17 55.1	18 29	Nov., 1851.
54	Cape Orford or Blanco	Extremity of the cape	42 50	124 30			
55	Cape Gregory	NW. part of the cape off Koos bay	43 20½	124 22½			
56	*Umpquah River light.* III—F. W.—16½	On the S. side of the river, at its mouth, 100 feet high	43 40 18.5	124 11 00.3	8 16 44.2		
57	Umpquah. 2 A	One mile from entrance to the river, (W. side)	43 41 45.0	124 09 57	8 16 39.8		
58	Cape Perpetua	Middle part of the headland	44 19	124 06			
59	Cape Foulweather	Southern part of the cape	44 45	124 04			
60	Cape Lookout	Sharp point furthest W	45 20	124 00			
61	Cape Meares	NW. part. The Cape Lookout of Meares and Vancouver	45 30	123 58			
62	Cape Falcon, or False Tillamook	Northern part	45 47	123 58			
63	Tillamook Head	SE. by S. ¼ S., 19 miles from Disappointment light	45 58	123 59			
64	Astor Point. 2 A	Near Astoria, Columbia river	46 11 27.6	123 49 31.7	8 15 18.1		
65	Point Adams	South Point, entrance to Columbia river, half a mile inside	46 12 30.4	123 56 55.8	8 15 47.7		
	WASHINGTON TERRITORY.						
66	*Cape Disappointment light-house.* I—F. W.—22½.—Bell	Near the highest part of the cape	46 16 32.7	124 02 13	8 16 08.9		
67	CAPE DISAPPOINTMENT	North Point, entrance to Columbia river, highest part	46 16 35.4	124 02 01	8 16 08.1	20 45	July, 1851.
68	Leadbetter Point	S. point of the entrance to Shoalwater bay	46 36 (45)	124 00 (45)	8 16 (03)		
69	*Cape Shoalwater light-house.* IV—F. W. Var. by Fl.—16	W. point of the entrance to Shoalwater bay, 87 feet high	46 44 11	124 02 24	8 16 09.6		
70	Point Hanson	S. point of the entrance to Gray's harbor	46 53 48.6	124 06 42.3	8 16 26.8		
71	Point Grenville	Point of the bluff at the anchorage	47 20 (00)	124 14 (00)	8 16 (56)		
72	Destruction island	North Point	47 41	124 25			
73	Flattery Rocks	Northwestern rocky islet	48 12	124 43			

74	*Tatoosh Island light-house. I—F. W.—20	Off Cape Flattery, Strait of Juan de Fuca	48 23 15.5	124 43 48	8 18 55.2	21 30	Aug., 1852.
75	NEE'-AH BAY	Near the creek, in Neé-ah bay, Strait of Juan de Fuca	48 21 48.8	124 37 12	8 18 28.8	21 47	Aug., 1855.
76	Port Angeles. 2 A	Head of the bay, Strait of Juan de Fuca	48 07 51.5	123 27 21	8 13 49.4	.....	.....
77	New Dungeness light-house. III—F. W.—16½	On the end of the Sand Point, Strait of Juan de Fuca	48 10 59.0	123 06 07	8 12 24.5	.....	.....
78	Smith's Island light-house. IV—Rv. W.Var. Fl. every ½ M	SW. point of the island	48 19 01.0	122 50 01	8 11 20.1	.....	.....
79	Point Wilson	W. point of entrance to Admiralty inlet	48 08 42.7	122 44 49.4	8 10 59.3	.....	.....
80	Point Hudson. 2 A	In Port Townshend, extremity of the point	48 07 02.7	124 44 46.5	8 10 59.1	21 40	Aug., 1856.
81	Admiralty Head light-house. IV—F. W.—17½	E. side of entrance to Admiralty inlet, 119 feet high	48 09 21.6	122 40 08	8 10 40.5	.....	.....
82	Port Gamble	Four miles inside the entrance to Hood's canal, East Point	47 51 32.0	122 33 56	8 10 15.7	.....	.....
83	Restoration Point. 2 A	SE. point of Bainbridge island, Admiralty inlet	47 35 05.8	122 28 00.0	8 09 52.0	.....	.....
84	Point Pully. 2 A	E. side of Admiralty inlet, opposite Vashon's island	47 27 07.3	122 22 21.5	8 09 29.4	.....	.....
85	Lummi. 2 A	Sand point on the NE. side of the island	48 44 01.7	122 49 37	8 10 42.5	.....	.....
86	Lummi North	N. point of the island	48 44 53.2	122 42 12	8 10 48.8	.....	.....
	VANCOUVER ISLAND.		From	the Admiralty	charts.		
87	Observatory Rocks	SE. point of San Juan harbor, Strait of Juan de Fuca	48 31 30	124 28 15	8 17 53.0	.....	.....
88	Beechy Head	E. of Sooke inlet, Strait of Juan de Fuca	48 18 30	123 39 27	8 14 37.8	.....	.....
89	Race Rocks light-house. II—Fl. W. every 10 secs	Southernmost point of Vancouver, Strait of Juan de Fuca, 118 ft.	48 17 30	123 32 15	8 14 09.0	.....	.....
90	Fisgard Island light-house. IV—F.—15. See page 124	W. side of entrance to Esquimault harbor, Strait of Juan de Fuca, 70 feet high.	48 25 38	123 27 10	8 13 48.7	.....	.....

* Rock Duncan bears N. 33° W. (magnetic) from Tatoosh Island light, distant 1.02 mile.

TIDE TABLES FOR SAN DIEGO.*

TABLE I.

Time of moon's transit.	SOUTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
0 0	9 25	9 40	9 52	10 3	10 12	10 20	10 25	10 29	10 29	10 25	10 19	10 10	10 0	9 47	9 30
0 30	9 15	9 30	9 42	9 53	10 2	10 10	10 15	10 19	10 19	10 15	10 9	10 0	9 50	9 27	9 20
1 0	9 8	9 23	9 35	9 46	9 55	10 3	10 8	10 12	10 12	10 8	10 2	9 53	9 43	9 30	9 13
1 30	9 1	9 16	9 28	9 39	9 48	9 56	10 1	10 5	10 5	10 1	9 55	9 46	9 36	9 23	9 6
2 0	8 54	9 9	9 21	9 32	9 41	9 49	9 54	9 58	9 58	9 54	9 48	9 39	9 29	9 16	8 59
2 30	8 49	9 4	9 16	9 27	9 36	9 44	9 49	9 53	9 53	9 49	9 43	9 34	9 24	9 11	8 54
3 0	8 48	9 3	9 15	9 26	9 35	9 43	9 48	9 52	9 52	9 48	9 42	9 33	9 23	9 10	8 53
3 30	8 48	9 3	9 15	9 26	9 35	9 43	9 48	9 52	9 52	9 48	9 42	9 33	9 23	9 10	8 53
4 0	8 52	9 7	9 19	9 30	9 39	9 47	9 52	9 56	9 56	9 52	9 46	9 37	9 27	9 14	8 57
4 30	8 56	9 11	9 23	9 34	9 43	9 51	9 56	10 0	10 0	9 56	9 50	9 41	9 31	9 18	9 1
5 0	9 15	9 30	9 42	9 53	10 2	10 10	10 15	10 19	10 19	10 15	10 9	10 0	9 50	9 37	9 20
5 30	9 37	9 52	10 4	10 15	10 24	10 32	10 37	10 41	10 41	10 37	10 31	10 22	10 12	9 59	9 42
6 0	9 55	10 10	10 22	10 33	10 42	10 50	10 55	10 59	10 59	10 55	10 49	10 40	10 30	10 17	10 0
6 30	10 12	10 27	10 39	10 50	10 59	11 7	11 12	10 16	10 16	11 12	11 6	10 57	10 47	10 34	10 17
7 0	10 18	10 33	10 45	10 56	11 5	11 13	11 18	11 22	11 22	11 18	11 12	11 3	10 53	10 40	10 23
7 30	10 20	10 35	10 47	10 58	11 7	11 15	11 20	11 24	11 24	11 20	11 14	11 5	10 55	10 42	10 25
8 0	10 22	10 37	10 49	11 0	11 9	11 17	11 22	11 26	11 26	11 22	11 16	11 7	10 57	10 44	10 27
8 30	10 24	10 39	10 51	11 2	11 11	11 19	11 24	11 28	11 28	11 24	11 18	11 9	10 59	10 46	10 29
9 0	10 18	10 33	10 45	10 56	11 5	11 13	11 18	11 22	11 22	11 18	11 12	11 3	10 53	10 40	10 23
9 30	10 10	10 25	10 37	10 48	10 57	11 5	11 10	11 14	11 14	11 10	11 4	10 55	10 45	10 32	10 15
10 0	10 0	10 15	10 27	10 38	10 47	10 55	11 0	11 4	11 4	11 0	10 54	10 45	10 35	10 22	10 5
10 30	9 53	10 8	10 20	10 31	10 40	10 48	10 53	10 57	10 57	10 53	10 47	10 38	10 28	10 15	9 58
11 0	9 45	10 0	10 12	10 23	10 32	10 40	10 45	10 49	10 49	10 45	10 39	10 30	10 20	10 7	9 50
11 30	9 36	9 51	10 3	10 14	10 23	10 31	10 36	10 40	10 40	10 36	10 30	10 21	10 11	9 58	9 41

TABLE II.

Time of moon's transit.	NORTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
0 0	9 30	9 16	9 4	8 53	8 44	8 36	8 31	8 27	8 27	8 31	8 37	8 46	8 56	9 9	9 26
0 30	9 21	9 6	8 54	8 43	8 34	8 26	8 21	8 17	8 17	8 21	8 27	8 36	8 46	8 59	9 16
1 0	9 14	8 59	8 47	8 36	8 27	8 19	8 14	8 10	8 10	8 14	8 20	8 29	8 39	8 52	9 9
1 30	9 7	8 52	8 40	8 29	8 20	8 12	8 7	8 3	8 3	8 7	8 13	8 22	8 32	8 45	9 2
2 0	9 0	8 45	8 33	8 22	8 13	8 5	8 0	7 56	7 56	8 0	8 6	8 15	8 25	8 38	8 55
2 30	8 55	8 40	8 28	8 17	8 8	8 0	7 55	7 51	7 51	7 55	8 1	8 10	8 20	8 33	8 50
3 0	8 54	8 39	8 27	8 16	8 7	7 59	7 54	7 50	7 50	7 54	8 0	8 9	8 19	8 32	8 49
3 30	8 54	8 39	8 27	8 16	8 7	7 59	7 54	7 50	7 50	7 54	8 0	8 9	8 19	8 32	8 49
4 0	8 58	8 43	8 31	8 20	8 11	8 3	7 58	7 54	7 54	7 58	8 4	8 13	8 23	8 36	8 53
4 30	9 2	8 47	8 35	8 24	8 15	8 7	8 2	7 58	7 58	8 2	8 8	8 17	8 27	8 40	8 57
5 0	9 21	9 6	8 54	8 43	8 34	8 26	8 21	8 17	8 17	8 21	8 27	8 36	8 46	8 59	9 16
5 30	9 43	9 28	9 16	9 5	8 56	8 48	8 43	8 39	8 39	8 43	8 49	8 58	9 8	9 21	9 38
6 0	10 1	9 46	9 34	9 23	9 14	9 6	9 1	8 57	8 57	9 1	9 7	9 16	9 26	9 39	9 56
6 30	10 18	10 3	9 51	9 40	9 31	9 23	9 18	9 14	9 14	9 18	9 24	9 33	9 43	9 56	10 13
7 0	10 24	10 9	9 57	9 46	9 37	9 29	9 24	9 20	9 20	9 24	9 30	9 39	9 49	10 2	10 19
7 30	10 26	10 11	9 59	9 48	9 39	9 31	9 26	9 22	9 22	9 26	9 32	9 41	9 51	10 4	10 21
8 0	10 28	10 13	10 1	9 50	9 41	9 33	9 28	9 24	9 24	9 28	9 34	9 43	9 53	10 6	10 23
8 30	10 30	10 15	10 3	9 52	9 43	9 35	9 30	9 26	9 26	9 30	9 36	9 45	9 55	10 8	10 25
9 0	10 24	10 9	9 57	9 46	9 37	9 29	9 24	9 20	9 20	9 24	9 30	9 39	9 49	10 2	10 19
9 30	10 16	10 1	9 49	9 38	9 29	9 21	9 16	9 12	9 12	9 16	9 22	9 31	9 41	9 54	10 11
10 0	10 6	9 51	9 39	9 28	9 19	9 11	9 6	9 2	9 2	9 6	9 12	9 21	9 31	9 44	10 1
10 30	9 59	9 44	9 32	9 21	9 12	9 4	8 59	8 55	8 55	8 59	9 5	9 14	9 24	9 37	9 54
11 0	9 51	9 36	9 24	9 13	9 4	8 56	8 51	8 47	8 47	8 51	8 57	9 6	9 16	9 29	9 46
11 30	9 42	9 27	9 15	9 4	8 55	8 47	8 42	8 38	8 38	8 42	8 48	8 57	9 7	9 20	9 37

* For the manner of using these tables, see the example for San Francisco, pages 44–49.

TABLE III.

Days from moon's greatest declination.		SOUTH DECLINATION. Low water. (Small.)	SOUTH DECLINATION. High water. (Large.)	SOUTH DECLINATION. Low water. (Large.)	NORTH DECLINATION. Low water. (Large.)	NORTH DECLINATION. High water. (Small.)	NORTH DECLINATION. Low water. (Small.)	Days from moon's greatest declination.	
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.		
Before.	7	5 44	12 28	18 44	6 16	12 16	18 00	7	Before.
	6	5 18	11 58	18 40	6 42	12 46	18 04	6	
	5	5 00	11 34	18 34	7 00	13 10	18 10	5	
	4	4 47	11 12	18 25	7 13	13 32	18 19	4	
	3	4 34	10 54	18 20	7 26	13 50	18 24	3	
	2	4 24	10 38	18 14	7 36	14 06	18 30	2	
	1	4 17	10 28	18 11	7 43	14 16	18 33	1	
	0	4 12	10 20	18 08	7 48	14 24	18 36	0	
After.	1	4 14	10 20	18 06	7 46	14 24	18 38	1	After.
	2	4 24	10 28	18 04	7 36	14 16	18 40	2	
	3	4 38	10 40	18 02	7 22	14 04	18 42	3	
	4	5 01	10 58	17 57	6 59	13 46	18 47	4	
	5	5 25	11 18	17 53	6 35	13 26	18 51	5	
	6	5 49	11 44	17 55	6 11	13 00	18 49	6	
	7	6 18	12 18	18 00	5 42	12 26	18 44	7	

TABLE IV.

Time of moon's transit.	SOUTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION. Before— 7	6	5	4	3	2	1	0	After— 1	2	3	4	5	6	7
Hour.	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*
0	4.7	4.5	4.3	4.2	4.1	4.1	4.1	4.1	4.2	4.3	4.5	4.8	5.1	5.5	5.8
1	4.6	4.4	4.2	4.1	4.0	4.0	4.0	4.0	4.1	4.2	4.4	4.7	5.0	5.4	5.7
2	4.4	4.2	4.0	3.9	3.8	3.8	3.8	3.8	3.9	4.0	4.2	4.5	4.8	5.2	5.5
3	4.1	3.9	3.7	3.6	3.5	3.5	3.5	3.5	3.6	3.7	3.9	4.2	4.5	4.9	5.2
4	3.8	3.6	3.4	3.3	3.2	3.2	3.2	3.2	3.3	3.4	3.6	3.9	4.2	4.6	4.9
5	3.6	3.4	3.2	3.1	3.0	3.0	3.0	3.0	3.1	3.2	3.4	3.7	4.0	4.4	4.7
6	3.6	3.4	3.2	3.1	3.0	3.0	3.0	3.0	3.1	3.2	3.4	3.7	4.0	4.4	4.7
7	3.7	3.5	3.3	3.2	3.1	3.1	3.1	3.1	3.2	3.3	3.5	3.8	4.1	4.5	4.8
8	3.8	3.6	3.4	3.3	3.2	3.2	3.2	3.2	3.3	3.4	3.6	3.9	4.2	4.6	4.9
9	4.4	4.2	4.0	3.9	3.8	3.8	3.8	3.8	3.9	4.0	4.2	4.5	4.8	5.2	5.5
10	4.7	4.5	4.3	4.2	4.1	4.1	4.1	4.1	4.2	4.3	4.5	4.8	5.1	5.5	5.8
11	4.8	4.6	4.4	4.3	4.2	4.2	4.2	4.2	4.3	4.4	4.6	4.9	5.2	5.6	5.9

TABLE V.

Time of moon's transit.	NORTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION. Before— 7	6	5	4	3	2	1	0	After— 1	2	3	4	5	6	7
Hour.	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*	*Ft.*
0	5.7	5.9	6.1	6.2	6.3	6.3	6.3	6.3	6.2	6.1	5.9	5.6	5.3	4.9	4.6
1	5.6	5.8	6.0	6.1	6.2	6.2	6.2	6.2	6.1	6.0	5.8	5.5	5.2	4.8	4.5
2	5.4	5.6	5.8	5.9	6.0	6.0	6.0	6.0	5.9	5.8	5.6	5.3	5.0	4.6	4.3
3	5.1	5.3	5.5	5.6	5.7	5.7	5.7	5.7	5.6	5.5	5.3	5.0	4.7	4.3	4.0
4	4.8	5.0	5.2	5.3	5.4	5.4	5.4	5.4	5.3	5.2	5.0	4.7	4.4	4.0	3.7
5	4.6	4.8	5.0	5.1	5.2	5.2	5.2	5.2	5.1	5.0	4.8	4.5	4.2	3.8	3.5
6	4.6	4.8	5.0	5.1	5.2	5.2	5.2	5.2	5.1	5.0	4.8	4.5	4.2	3.8	3.5
7	4.7	4.9	5.1	5.2	5.3	5.3	5.3	5.3	5.2	5.1	4.9	4.6	4.3	3.9	3.6
8	4.8	5.0	5.2	5.3	5.4	5.4	5.4	5.4	5.3	5.2	5.0	4.7	4.4	4.0	3.7
9	5.4	5.6	5.8	5.9	6.0	6.0	6.0	6.0	5.9	5.8	5.6	5.3	5.0	4.6	4.3
10	5.7	5.9	6.1	6.2	6.3	6.3	6.3	6.3	6.2	6.1	5.9	5.6	5.3	4.9	4.6
11	5.8	6.0	6.2	6.3	6.4	6.4	6.4	6.4	6.3	6.2	6.0	5.7	5.4	5.0	4.7

NOTE.—To use these tables with a chart on which the soundings are referred to mean low water, subtract 1.2 foot from the numbers in the tables for all places from San Diego to Astoria.

TABLE VI.

Time of moon's transit.	SMALL EBB TIDE, OR FROM SMALL HIGH WATER TO SMALL LOW WATER. Days from moon's greatest declination. Before—								After—							FROM SMALL LOW WATER TO LARGE HIGH WATER. Days from moon's greatest declination. Before—								After—							Time of moon's transit.
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	
H.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	H.
0	4.0	3.4	3.0	2.6	2.3	2.1	2.0	2.0	2.1	2.3	2.7	3.2	3.8	4.6	5.2	5.1	4.9	4.7	4.5	4.4	4.3	4.2	4.2	4.1	4.1	4.0	4.0	3.9	3.9	4.0	0
1	3.8	3.2	2.8	2.4	2.1	1.9	1.8	1.8	1.9	2.1	2.5	3.0	3.6	4.4	5.0	4.9	4.7	4.5	4.3	4.2	4.1	4.0	4.0	3.9	3.9	3.8	3.8	3.7	3.7	3.8	1
2	3.5	2.9	2.5	2.1	1.8	1.6	1.5	1.5	1.6	1.8	2.2	2.7	3.3	4.1	4.7	4.6	4.4	4.2	4.0	3.9	3.8	3.7	3.7	3.6	3.6	3.5	3.5	3.4	3.4	3.5	2
3	3.0	2.4	2.0	1.6	1.3	1.1	1.0	1.0	1.1	1.3	1.7	2.2	2.8	3.6	4.2	4.1	3.9	3.7	3.5	3.4	3.3	3.2	3.2	3.1	3.1	3.0	3.0	2.9	2.9	3.0	3
4	2.2	1.6	1.2	0.8	0.5	0.3	0.2	0.2	0.3	0.5	0.9	1.4	2.0	2.8	3.4	3.3	3.1	2.9	2.7	2.6	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.1	2.1	2.2	4
5	1.7	1.1	0.7	0.3	0.0	-.2	-.3	-.3	-.2	0.0	0.4	0.9	1.5	2.3	2.9	2.8	2.6	2.4	2.2	2.1	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.6	1.6	1.7	5
6	1.8	1.2	0.8	0.4	0.1	-.1	-.2	-.2	-.1	0.1	0.5	1.0	1.6	2.4	3.0	2.9	2.7	2.5	2.3	2.2	2.1	2.0	2.0	1.9	1.9	1.8	1.8	1.7	1.7	1.8	6
7	2.3	1.7	1.3	0.9	0.6	0.4	0.3	0.3	0.4	0.6	1.0	1.5	2.1	2.9	3.5	3.4	3.2	3.0	2.8	2.7	2.6	2.5	2.5	2.4	2.4	2.3	2.3	2.2	2.2	2.3	7
8	2.9	2.3	1.9	1.5	1.2	1.0	0.9	0.9	1.0	1.2	1.6	2.1	2.7	3.5	4.1	4.0	3.8	3.6	3.4	3.3	3.2	3.1	3.1	3.0	3.0	2.9	2.9	2.8	2.8	2.9	8
9	3.7	3.1	2.7	2.3	2.0	1.8	1.7	1.7	1.8	2.0	2.4	2.9	3.5	4.3	4.9	4.8	4.6	4.4	4.2	4.1	4.0	3.9	3.9	3.8	3.8	3.7	3.7	3.6	3.6	3.7	9
10	4.2	3.6	3.2	2.8	2.5	2.3	2.2	2.2	2.3	2.5	2.9	3.4	4.0	4.8	5.4	5.3	5.1	4.9	4.7	4.6	4.5	4.4	4.4	4.3	4.3	4.2	4.2	4.1	4.1	4.2	10
11	4.3	3.7	3.3	2.9	2.6	2.4	2.3	2.3	2.4	2.6	3.0	3.5	4.1	4.9	5.5	5.4	5.2	5.0	4.8	4.7	4.6	4.5	4.5	4.4	4.4	4.3	4.3	4.2	4.2	4.3	11

TABLE VII.

Time of moon's transit.	LARGE EBB TIDE, OR FROM LARGE HIGH WATER TO LARGE LOW WATER. Days from moon's greatest declination. Before—								After—							FROM LARGE LOW WATER TO SMALL HIGH WATER. Days from moon's greatest declination. Before—								After—							Time of moon's transit.
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	7	6	5	4	3	2	1	0	1	2	3	4	5	6	.7	
H.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft	Ft.	Ft.	Ft.	Ft.	H.
0	5.2	5.8	6.2	6.6	6.9	7.1	7.2	7.2	7.2	6.9	6.5	6.0	5.4	4.6	4.0	4.1	4.3	4.5	4.7	4.8	4.9	5.0	5.0	5.1	5.1	5.2	5.2	5.3	5.3	5.2	0
1	5.0	5.6	6.0	6.4	6.7	6.9	7.0	7.0	6.9	6.7	6.3	5.8	5.2	4.4	3.8	3.9	4.1	4.3	4.5	4.6	4.7	4.8	4.8	4.9	4.9	5.0	5.0	5.1	5.1	5.0	1
2	4.7	5.3	5.7	6.1	6.4	6.6	6.7	6.7	6.6	6.4	6.0	5.5	4.9	4.1	3.5	3.6	3.8	4.0	4.2	4.3	4.4	4.5	4.5	4.6	4.6	4.7	4.7	4.8	4.8	4.7	2
3	4.2	4.8	5.2	5.6	5.9	6.1	6.2	6.2	6.1	5.9	5.5	5.0	4.4	3.6	3.0	3.1	3.3	3.5	3.7	3.8	3.9	4.0	4.0	4.1	4.1	4.2	4.2	4.3	4.3	4.2	3
4	3.4	4.0	4.4	4.8	5.1	5.3	5.4	5.4	5.3	5.1	4.7	4.2	3.6	2.8	2.2	2.3	2.5	2.7	2.9	3.0	3.1	3.2	3.2	3.3	3.3	3.4	3.4	3.5	3.5	3.4	4
5	2.9	3.5	3.9	4.3	4.6	4.8	4.9	4.9	4.8	4.6	4.2	3.7	3.1	2.3	1.7	1.8	2.0	2.2	2.4	2.5	2.6	2.7	2.7	2.8	2.8	2.9	2.9	3.0	3.0	2.9	5
6	3.0	3.6	4.0	4.4	4.7	4.9	5.0	5.0	4.9	4.7	4.3	3.8	3.2	2.4	1.8	1.9	2.1	2.3	2.5	2.6	2.7	2.8	2.8	2.9	2.9	3.0	3.0	3.1	3.1	3.0	6
7	3.5	4.1	4.5	4.9	5.2	5.4	5.5	5.5	5.4	5.2	4.8	4.3	3.7	2.9	2.3	2.4	2.6	2.8	3.0	3.1	3.2	3.3	3.3	3.4	3.4	3.5	3.5	3.6	3.6	3.5	7
8	4.1	4.7	5.1	5.5	5.8	6.0	6.1	6.1	6.0	5.8	5.4	4.9	4.3	3.5	2.9	3.0	3.2	3.4	3.6	3.7	3.8	3.9	3.9	4.0	4.0	4.1	4.1	4.2	4.2	4.1	8
9	4.9	5.5	5.9	6.3	6.6	6.8	6.9	6.9	6.8	6.6	6.2	5.7	5.1	4.3	3.7	3.8	4.0	4.2	4.4	4.5	4.6	4.7	4.7	4.8	4.8	4.9	4.9	5.0	5.0	4.9	9
10	5.4	6.0	6.4	6.8	7.1	7.3	7.4	7.4	7.3	7.1	6.7	6.2	5.6	4.8	4.2	4.3	4.5	4.7	4.9	5.0	5.1	5.2	5.2	5.3	5.3	5.4	5.4	5.5	5.5	5.4	10
11	5.5	6.1	6.5	6.9	7.2	7.4	7.5	7.5	7.4	7.2	6.8	6.3	5.7	4.9	4.3	4.4	4.6	4.8	5.0	5.1	5.2	5.3	5.3	5.4	5.4	5.5	5.5	5.6	5.6	5.5	11

TIDE TABLES FOR ASTORIA.*

TABLE I.

Time of moon's transit.	SOUTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
0 0	12 42	12 55	13 5	13 18	13 28	13 38	13 41	13 45	13 46	13 44	13 40	13 34	13 24	13 14	13 2
0 30	12 36	12 49	12 59	13 12	13 22	13 32	13 35	13 39	13 40	13 38	13 34	13 28	13 18	13 8	12 56
1 0	12 29	12 42	12 52	13 5	13 15	13 25	13 28	13 32	13 33	13 31	13 27	13 21	13 11	13 1	12 49
1 30	12 23	12 36	12 46	12 59	13 9	13 19	13 22	13 26	13 27	13 25	13 21	13 15	13 5	12 55	12 43
2 0	12 15	12 28	12 38	12 51	13 1	13 11	13 14	13 18	13 19	13 17	13 13	13 7	12 57	12 47	12 35
2 30	12 9	12 22	12 32	12 45	12 55	13 5	13 8	13 12	13 13	13 11	13 7	13 1	12 51	12 41	12 29
3 0	12 3	12 16	12 26	12 39	12 49	12 59	13 2	13 6	13 7	13 5	13 1	12 55	12 45	12 35	12 23
3 30	11 58	12 11	12 21	12 34	12 44	12 54	12 57	13 1	13 2	13 0	12 56	12 50	12 40	12 30	12 18
4 0	11 57	12 10	12 20	12 33	12 43	12 53	12 56	13 0	13 1	12 59	12 55	12 49	12 39	12 29	12 17
4 30	12 0	12 13	12 23	12 36	12 46	12 56	12 59	13 3	13 4	13 2	12 58	12 52	12 42	12 32	12 20
5 0	12 8	12 21	12 31	12 44	12 54	13 4	13 7	13 11	13 12	13 10	13 6	13 0	12 50	12 40	12 28
5 30	12 15	12 28	12 38	12 51	13 1	13 11	13 14	13 18	13 19	13 17	13 13	13 7	12 57	12 47	12 35
6 0	12 25	12 38	12 48	13 1	13 11	13 21	13 24	13 28	13 29	13 27	13 23	13 17	13 7	12 57	12 45
6 30	12 36	12 49	12 59	13 12	13 22	13 32	13 35	13 39	13 40	13 38	13 34	13 28	13 18	13 8	12 56
7 0	12 45	12 58	13 8	13 21	13 31	13 41	13 44	13 48	13 49	13 47	13 43	13 37	13 27	13 17	13 5
7 30	12 55	13 8	13 18	13 31	13 41	13 51	13 54	13 58	13 59	13 57	13 53	13 47	13 37	13 27	13 15
8 0	13 3	13 16	13 26	13 39	13 49	13 59	14 2	14 6	14 7	14 5	14 1	13 55	13 45	13 35	13 23
8 30	13 8	13 21	13 31	13 44	13 54	14 4	14 7	14 11	14 12	14 10	14 6	14 0	13 50	13 40	13 28
9 0	13 10	13 23	13 33	13 46	13 56	14 6	14 9	14 13	14 14	14 12	14 8	14 2	13 52	13 42	13 30
9 30	13 9	13 22	13 32	13 45	13 55	14 5	14 8	14 12	14 13	14 11	14 7	14 1	13 51	13 41	13 29
10 0	13 5	13 18	13 28	13 41	13 51	14 1	14 4	14 8	14 9	14 7	14 3	13 57	13 47	13 37	13 25
10 30	12 59	13 12	13 22	13 35	13 45	13 55	13 58	14 2	14 3	14 1	13 57	13 51	13 41	13 31	13 19
11 0	12 53	13 6	13 16	13 29	13 39	13 49	13 52	13 56	13 57	13 55	13 51	13 45	13 35	13 25	13 13
11 30	12 46	12 59	13 9	13 22	13 32	13 42	13 45	13 49	13 50	13 48	13 44	13 38	13 28	13 18	13 6

TABLE II.

Time of moon's transit.	NORTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
0 0	13 10	12 57	12 47	12 34	12 24	12 14	12 11	12 7	12 6	12 8	12 12	12 18	12 28	12 38	12 50
0 30	13 4	12 51	12 41	12 28	12 18	12 8	12 5	12 1	12 0	12 2	12 6	12 12	12 22	12 32	12 44
1 0	12 57	12 44	12 34	12 21	12 11	12 1	11 58	11 54	11 53	11 55	11 59	12 5	12 15	12 25	12 37
1 30	12 51	12 38	12 28	12 15	12 5	11 55	11 52	11 48	11 47	11 49	11 53	11 59	12 9	12 19	12 31
2 0	12 43	12 30	12 20	12 7	11 57	11 47	11 44	11 40	11 39	11 41	11 45	11 51	12 1	12 11	12 23
2 30	12 37	12 24	12 14	12 1	11 51	11 41	11 38	11 34	11 33	11 35	11 39	11 45	11 55	12 5	12 17
3 0	12 31	12 18	12 8	11 55	11 45	11 35	11 32	11 28	11 27	11 29	11 33	11 39	11 49	11 59	12 11
3 30	12 26	12 13	12 3	11 50	11 40	11 30	11 27	11 23	11 22	11 24	11 28	11 34	11 44	11 54	12 6
4 0	12 25	12 12	12 2	11 49	11 39	11 29	11 26	11 22	11 21	11 23	11 27	11 33	11 43	11 53	12 5
4 30	12 28	12 15	12 5	11 52	11 42	11 32	11 29	11 25	11 24	11 26	11 30	11 36	11 46	11 56	12 8
5 0	12 36	12 23	12 13	12 0	11 50	11 40	11 37	11 33	11 32	11 34	11 38	11 44	11 54	12 4	12 16
5 30	12 43	12 30	12 20	12 7	11 57	11 47	11 44	11 40	11 39	11 41	11 45	11 51	12 1	12 11	12 23
6 0	12 53	12 40	12 30	12 17	12 7	11 57	11 54	10 50	11 49	11 51	11 55	12 1	12 11	12 21	12 33
6 30	13 4	12 51	12 41	12 28	12 18	12 8	12 5	12 1	12 0	12 2	12 6	12 12	12 22	12 32	12 44
7 0	13 13	13 0	12 50	12 37	12 27	12 17	12 14	12 10	12 9	12 11	12 15	12 21	12 31	12 41	12 53
7 30	13 23	13 10	13 0	12 47	12 37	12 27	12 24	12 20	12 19	12 21	12 25	12 31	12 41	12 51	13 3
8 0	13 31	13 18	13 8	12 55	12 45	12 35	12 32	12 28	12 27	12 29	12 33	12 39	12 49	12 59	13 11
8 30	13 36	13 23	13 13	13 0	12 50	12 40	12 37	12 33	12 32	12 34	12 38	12 44	12 54	13 4	13 16
9 0	13 38	13 25	13 15	13 2	12 52	12 42	12 39	12 35	12 34	12 36	12 40	12 46	12 56	13 6	13 18
9 30	13 37	13 24	13 14	13 1	12 51	12 41	12 38	12 34	12 33	12 35	12 39	12 45	12 55	13 5	13 17
10 0	13 33	13 20	13 10	12 57	12 47	12 37	12 34	12 30	12 29	12 31	12 35	12 41	12 51	13 1	13 13
10 30	13 27	13 14	13 4	12 51	12 41	12 31	12 28	12 24	12 23	12 25	12 29	12 35	12 45	12 55	13 7
11 0	13 21	13 8	12 58	12 45	12 35	12 25	12 22	12 18	12 17	12 19	12 23	12 29	12 39	12 49	13 1
11 30	13 14	13 1	12 51	12 38	12 28	12 18	12 15	12 11	12 10	12 12	12 16	12 22	12 32	12 42	12 54

* For the manner of using these tables, see the examples for San Francisco, pages 44–49.

TABLE III.

Days from moon's greatest declination.		South declination. Low water. (Small.)	South declination. High water. (Large.)	South declination. Low water. (Large.)	North declination. Low water. (Large.)	North declination. High water. (Small.)	North declination. Low water. (Small.)		Days from moon's greatest declination.
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.		
Before.	7	6 38	12 59	19 17	6 18	12 03	18 41		7
	6	6 14	12 33	19 15	6 42	12 29	18 43		6
	5	5 55	12 13	19 14	7 01	12 49	18 44		5
	4	5 34	11 47	19 09	7 22	13 15	18 49		4
	3	5 20	11 27	19 03	7 36	13 35	18 55		3
	2	5 09	11 07	18 54	7 47	13 55	19 04		2
	1	5 05	11 01	18 52	7 51	14 01	19 06		1
	0	5 03	10 53	18 46	7 53	14 09	19 12		0
After.	1	5 05	10 51	18 42	7 51	14 11	19 16		1
	2	5 11	10 55	18 40	7 45	14 07	19 18		2
	3	5 18	11 03	18 41	7 38	13 59	19 17		3
	4	5 32	11 15	18 39	7 24	13 47	19 19		4
	5	5 50	11 35	18 41	7 06	13 27	19 17		5
	6	6 11	11 55	18 40	6 45	13 07	19 18		6
	7	6 35	12 19	18 40	6 21	12 43	19 18		7

TABLE IV.

Time of moon's transit.	South declination.—Days from moon's greatest declination. Before— 7	6	5	4	3	2	1	0	After— 1	2	3	4	5	6	7
Hour.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
0	8.0	8.3	8.4	8.5	8.6	8.6	8.6	8.6	8.5	8.4	8.3	8.1	7.7	7.4	7.0
1	8.0	8.2	8.4	8.5	8.6	8.6	8.6	8.6	8.5	8.4	8.2	8.1	7.7	7.4	7.0
2	7.8	8.1	8.2	8.4	8.4	8.4	8.4	8.4	8.3	8.2	8.1	7.9	7.5	7.2	6.8
3	7.5	7.8	7.9	8.1	8.1	8.1	8.1	8.1	8.0	7.9	7.8	7.6	7.2	6.9	6.5
4	7.1	7.4	7.5	7.7	7.7	7.7	7.7	7.7	7.6	7.5	7.4	7.2	6.8	6.5	6.1
5	6.7	7.0	7.2	7.3	7.3	7.3	7.3	7.3	7.2	7.1	7.0	6.8	6.5	6.1	5.7
6	6.5	6.8	7.0	7.1	7.1	7.1	7.1	7.1	7.0	6.9	6.8	6.6	6.3	5.9	5.5
7	6.7	7.0	7.1	7.2	7.3	7.3	7.3	7.3	7.2	7.1	7.0	6.8	6.4	6.1	5.7
8	7.0	7.3	7.5	7.6	7.6	7.6	7.6	7.6	7.5	7.4	7.3	7.1	6.8	6.4	6.0
9	7.5	7.8	8.0	8.1	8.1	8.1	8.1	8.1	8.0	7.9	7.8	7.6	7.3	6.9	6.5
10	7.9	8.2	8.4	8.5	8.5	8.5	8.5	8.5	8.4	8.3	8.2	8.0	7.7	7.3	6.9
11	8.1	8.4	8.6	8.7	8.7	8.7	8.7	8.7	8.6	8.5	8.4	8.2	7.9	7.5	7.1

TABLE V.

Time of moon's transit.	North declination.—Days from moon's greatest declination. Before— 7	6	5	4	3	2	1	0	After— 1	2	3	4	5	6	7
Hour.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.	Feet.
0	7.4	7.1	6.9	6.8	6.8	6.8	6.8	6.8	6.9	7.0	7.1	7.3	7.6	8.0	8.4
1	7.4	7.1	6.9	6.8	6.8	6.8	6.8	6.8	6.9	7.0	7.1	7.3	7.6	8.0	8.4
2	7.2	6.9	6.8	6.6	6.6	6.6	6.6	6.6	6.7	6.8	6.9	7.1	7.5	7.8	8.2
3	6.9	6.6	6.5	6.3	6.3	6.3	6.3	6.3	6.4	6.5	6.6	6.8	7.2	7.5	7.9
4	6.5	6.2	6.1	5.9	5.9	5.9	5.9	5.9	6.0	6.1	6.2	6.4	6.7	7.1	7.5
5	6.1	5.9	5.7	5.6	5.5	5.5	5.6	5.6	5.7	5.7	5.9	6.0	6.4	6.7	7.1
6	5.9	5.7	5.5	5.4	5.3	5.3	5.3	5.4	5.5	5.5	5.7	5.9	6.2	6.5	6.9
7	6.1	5.8	5.6	5.5	5.5	5.5	5.5	5.5	5.6	5.7	5.8	6.0	6.3	6.7	7.1
8	6.4	6.2	6.0	5.9	5.8	5.8	5.8	5.8	5.9	6.0	6.2	6.3	6.7	7.0	7.4
9	6.9	6.7	6.5	6.4	6.3	6.3	6.3	6.4	6.4	6.5	6.7	6.8	7.2	7.5	7.9
10	7.3	7.1	6.9	6.8	6.7	6.7	6.7	6.8	6.9	6.9	7.0	7.2	7.6	7.9	8.3
11	7.5	7.2	7.1	7.0	6.9	6.9	6.9	6.9	7.0	7.1	7.2	7.4	7.8	8.1	8.5

NOTE.—To use these tables with a chart on which the soundings are referred to mean low water, subtract 1.2 foot from the numbers in the tables for Astoria and 1.7 for Neeah bay.

TABLE VI.

Hours of moon's transit.	SMALL EBB TIDE, OR FROM SMALL HIGH WATER TO SMALL LOW WATER.															FROM SMALL LOW WATER TO LARGE HIGH WATER.															Hours of moon's transit.
	Days from moon's greatest declination.															Days from moon's greatest declination.															
	Before—								After—							Before—								After—							
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	
H.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	H.
0	7.4	6.7	6.0	5.4	5.0	4.6	4.5	4.5	4 6	4.7	5.1	5.5	6.2	6.9	7.8	8.0	7.8	7.5	7.2	6.8	6.4	6.3	6.2	6.1	6.2	6.2	6.3	6.3	6.3	6.4	0
1	7.5	6.8	6.1	5.5	5.1	4.7	4.6	4.6	4.7	4.8	5.2	5.6	6.3	7.0	7.9	8.1	7.9	7.6	7.3	6.9	6.5	6.4	6.3	6.2	6.3	6.3	6.4	6.4	6.4	6.5	1
2	7.2	6.5	5.8	5.2	4.8	4.4	4.3	4.3	4.4	4.5	4.9	5.3	6 0	6.7	7.6	7.8	7.6	7.3	7.0	6.6	6.2	6.1	6.0	5.9	6.0	6.0	6.1	6.1	6.1	6.2	2
3	6.6	5.9	5.2	4.6	4.2	3.8	3.7	3.7	3.8	3.9	4.3	4.7	5.4	6.1	7.0	7.2	7.0	6.7	6.4	6.0	5.6	5.5	5.4	5.3	5.4	5.4	5.5	5.5	5.5	5.6	3
4	5.9	5.2	4.5	3.9	3.5	3.1	3.0	3.0	3.1	3.2	3.6	4.0	4.7	5.4	6.3	6.5	6.3	6.0	5.7	5.3	4.9	4.8	4.7	4.6	4.7	4.7	4.8	4.8	4.8	4.9	4
5	5.2	4.5	3.8	3.2	2.8	2.4	2.3	2.3	2.4	2.5	2.9	3.3	4.0	4.7	5.6	5.8	5.6	5.3	5.0	4.6	4.2	4.1	4.0	3.9	4.0	4.0	4.1	4.1	4.1	4.2	5
6	4.8	4.1	3.4	2.8	2.4	2.0	1.9	1.9	2.0	2.1	2.5	2.9	3.6	4.3	5.2	5 4	5.2	4.9	4.6	4.2	3.8	3.7	3.6	3.5	3.6	3.6	3.7	3.7	3.7	3.8	6
7	5.0	4.3	3.6	3.0	2.6	2.2	2.1	2.1	2.2	2.3	2.7	2.1	3.8	4.5	5.4	5.6	5.4	5.1	4.8	4.4	4.0	3.9	3.8	3.7	3.8	3.8	3.9	3.9	3.9	4.0	7
8	5.5	4.8	4.1	3.5	3.1	2.7	2.6	2.6	2.7	2.8	3.2	3.6	4.3	5.0	5.9	6.1	5.9	5.6	5.3	4.9	4.5	4.4	4.3	4.2	4.3	4.3	4.4	4.4	4.4	4.5	8
9	6.3	5.6	4.9	4.3	3.9	3.5	3.4	3.4	3.5	3.6	4.0	4.4	5.1	5.8	6.7	6.9	6.7	6.4	6.1	5.7	5.3	5.2	5.1	5.0	5.1	5.1	5.2	5.2	5.2	5.3	9
10	7.0	6.3	5.6	5.0	4.6	4.2	4.1	4.1	4.2	4.3	4.7	5.1	5.8	6.5	7.4	7.6	7.4	7.1	6.8	6.4	6.0	5.9	5.8	5.7	5.8	5.8	5.9	5.9	5.9	6.0	10
11	7.3	6.6	6.9	5.3	4.9	4.5	4.4	4.4	4.5	4.6	5.0	5.4	6.1	6.8	7.7	7.9	7.7	7.4	7.1	6.7	6.3	6.2	6.1	6.0	6.1	6.1	6.2	6.2	6.2	6.3	11

TABLE VII.

Hours of moon's transit.	LARGE EBB TIDE, OR FROM LARGE HIGH WATER TO LARGE LOW WATER.															FROM LARGE LOW WATER TO SMALL HIGH WATER.															Hours of moon's transit.
	Days from moon's greatest declination.															Days from moon's greatest declination.															
	Before—								After—							Before—								After—							
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	
H.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	H.
0	7.0	7.7	8.4	9.0	9.4	9.8	9.9	9.9	9.8	9.7	9.3	8.9	8 2	7.5	6.6	6.4	6.6	6.9	7.2	7.6	8.0	8.1	8.2	8.3	8.2	8.2	8.1	8.1	8.1	8.0	0
1	7.1	7.8	8.5	9.1	9.5	9.9	10.0	10.0	9.9	9.8	9.4	9.0	8.3	7.6	6.7	6.5	6.7	7.0	7.3	7.7	8.1	8.2	8.3	8.4	8.3	8.3	8.2	8.2	8.2	8.1	1
2	6.8	7.5	8.2	8.8	9.2	9.6	9.7	9.7	9.6	9.5	9.1	8.7	8.0	7.3	6.4	6.2	6.4	6.7	7.0	7.4	7.8	7.9	8.0	8.1	8.0	8.0	7.9	7.9	7.9	7.8	2
3	6.2	6.9	7.6	8.2	8.6	9.0	9.1	9.1	9.0	8.9	8.5	8.1	7.4	6.7	5.8	5.6	5.8	6.1	6.4	6.8	7.2	7.3	7.4	7.5	7.4	7.4	7.3	7.3	7.3	7.2	3
4	5.5	6.2	6.9	7.5	7.9	8.3	8.4	8.4	8.3	8.2	7.8	7.4	6.7	6.0	5.1	4.9	5.1	5.4	5.7	6.1	6.5	6.6	6.7	6.8	6.7	6 7	6.6	6.6	6.6	6.5	4
5	4.8	5.5	6.2	6.8	7.2	7.6	7.7	7.7	7.6	7.5	7.1	6.7	6.0	5.3	4.4	4.2	4.4	4.7	5.0	5.4	5.8	5.9	6.0	6.1	6.0	6.0	5.9	5.9	5.9	5.8	5
6	4.4	5.1	5.8	6.4	6.8	7.2	7.3	7.3	7.2	7.1	6.7	6.3	5.6	4.9	4.0	3.8	4.0	4.3	4.6	5.0	5.4	5.5	5.6	5.7	5.6	5.6	5.5	5.5	5.5	5.4	6
7	4.6	5.3	6.0	6.6	7.0	7.4	7.5	7.5	7.4	7.3	6.9	6.5	5.8	5.1	4.2	4.0	4.2	4.5	4.8	5.2	5.6	5.7	5.8	5.9	5.8	5.8	5.7	5.7	5.7	5.6	7
8	5.1	5.8	6.5	7.1	7.5	7.9	8.0	8.0	7.9	7.8	7.4	7.0	6.3	5.6	4.7	4.5	4.7	5.0	5.3	5.7	6 1	6.2	6.3	6.4	6.3	6.3	6.2	6.2	6.2	6.1	8
9	5.9	6.6	7.3	7.9	8.3	8.7	8.8	8.8	8.7	8.6	8.2	7.8	7.1	6.4	5.5	5.3	5.5	5.8	6.1	6.5	6.9	7.0	7.1	7.2	7.1	7.1	7.0	7.0	7.0	6.9	9
10	6.6	7.3	8.0	8.6	9.0	9.4	9.5	9.5	9.4	9.3	8.9	8.5	7.8	7.1	6.2	6.0	6.2	6.5	6.8	7.2	7.6	7.7	7.8	7.9	7.8	7.8	7.7	7.7	7.7	7.6	10
11	6.9	7.6	8.3	8.9	9.3	9.7	9.8	9.8	9.7	9.6	9.2	8.8	8.1	7.4	7.5	6.3	6.5	6.8	7.1	7.5	7.9	8.0	8.1	8.2	8.1	8.1	8.0	8.0	8.0	7.9	11

TIDE TABLES FOR PORT TOWNSHEND.*

TABLE I.

Time of moon's transit.	SOUTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
0 0	3 45	3 21	2 51	2 2	1 32	1 13	1 26	1 44	2 2	2 21	2 42	2 57	3 15	3 33	3 45
0 30	3 38	3 14	2 44	1 55	1 25	1 6	1 19	1 37	1 55	2 14	2 35	2 50	3 8	3 26	3 38
1 0	3 32	3 8	2 38	1 49	1 19	1 0	1 13	1 31	1 49	2 8	2 29	2 44	3 2	3 20	3 32
1 30	3 26	3 2	2 32	1 43	1 13	0 54	1 7	1 25	1 43	2 2	2 23	2 38	2 56	3 14	3 26
2 0	3 21	2 57	2 27	1 38	1 8	0 49	1 2	1 20	1 38	1 57	2 18	2 33	2 51	3 9	3 21
2 30	3 18	2 54	2 24	1 35	1 5	0 46	0 59	1 17	1 35	1 54	2 15	2 20	2 48	3 6	3 18
3 0	3 16	2 52	2 22	1 33	1 3	0 44	0 57	1 15	1 33	1 52	2 13	2 28	2 46	3 4	3 16
3 30	3 17	2 53	2 23	1 34	1 4	0 45	0 58	1 16	1 34	1 53	2 14	2 29	2 47	3 5	3 17
4 0	3 21	2 57	2 27	1 38	1 8	0 49	1 2	1 20	1 38	1 57	2 18	2 33	2 51	3 9	3 21
4 30	3 26	3 2	2 32	1 43	1 13	0 54	1 7	1 25	1 43	2 2	2 23	2 38	2 56	3 14	3 26
5 0	3 32	3 8	2 38	1 49	1 19	1 0	1 13	1 31	1 49	2 8	2 29	2 44	3 2	3 20	3 32
5 30	3 41	3 17	2 47	1 58	1 28	1 9	1 22	1 40	1 58	2 17	2 38	2 53	3 11	3 29	3 41
6 0	3 52	3 28	2 58	2 9	1 39	1 20	1 33	1 51	2 9	2 28	2 49	3 4	3 22	3 40	3 52
6 30	4 1	3 37	3 7	2 18	1 48	1 29	1 42	2 0	2 18	2 37	2 58	3 13	3 31	3 49	4 1
7 0	4 8	3 44	3 14	2 25	1 55	1 36	1 49	2 7	2 25	2 44	3 5	3 20	3 38	3 56	4 8
7 30	4 15	3 51	3 21	2 32	2 2	1 43	1 56	2 14	2 32	2 51	3 12	3 27	3 45	4 3	4 15
8 0	4 18	3 54	3 24	2 35	2 5	1 46	1 59	2 17	2 35	2 54	3 15	3 30	3 48	4 6	4 18
8 30	4 19	3 55	3 25	2 36	2 6	1 47	2 0	2 18	2 36	2 55	3 16	3 31	3 49	4 7	4 19
9 0	4 18	3 54	3 24	2 35	2 5	1 46	1 59	2 17	2 35	2 54	3 15	3 30	3 48	4 6	4 18
9 30	4 15	3 51	3 21	2 32	2 2	1 43	1 56	2 14	2 32	2 51	3 12	3 27	3 45	4 3	4 15
10 0	4 10	3 46	3 16	2 27	1 57	1 38	1 51	2 9	2 27	2 46	3 7	3 22	3 40	3 58	4 10
10 30	4 6	3 42	3 12	3 23	1 53	1 34	1 47	2 5	2 23	2 42	3 3	3 18	3 36	3 54	4 6
11 0	4 0	3 36	3 6	2 17	1 47	1 28	1 41	1 59	2 17	2 36	2 57	3 12	3 30	3 48	4 0
11 30	3 54	3 30	3 0	2 11	1 41	1 22	1 35	1 53	2 11	2 30	2 51	3 6	3 24	3 42	3 54

TABLE II.

Time of moon's transit.	NORTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h.m.	h. m.
0 0	3 45	4 9	4 39	5 28	5 58	6 17	6 4	5 46	5 28	5 9	4 48	4 33	4 15	3 57	3 45
0 30	3 38	4 2	4 32	5 21	5 51	6 10	5 57	5 39	5 21	5 2	4 41	4 26	4 8	3 50	3 38
1 0	3 32	3 56	4 26	5 15	5 45	6 4	5 51	5 33	5 15	4 56	4 35	4 20	4 2	3 44	3 32
1 30	3 26	3 50	4 20	5 9	5 39	5 58	5 45	5 27	5 9	4 50	4 29	4 14	3 56	3 38	3 26
2 0	3 21	3 45	4 15	5 4	5 34	5 53	5 40	5 22	5 4	4 45	4 24	4 9	3 51	3 33	3 21
2 30	3 18	3 42	4 12	5 1	5 31	5 50	5 37	5 19	5 1	4 42	4 21	4 6	3 48	3 30	3 18
3 0	3 16	3 40	4 10	4 59	5 29	5 48	5 35	5 17	4 59	4 40	4 19	4 4	3 46	3 28	3 16
3 30	3 17	3 41	4 11	5 0	5 30	5 49	5 36	5 18	5 0	4 41	4 20	4 5	3 47	3 29	3 17
4 0	3 21	3 45	4 15	5 4	5 34	5 53	5 40	5 22	5 4	4 45	4 24	4 9	3 51	3 33	3 21
4 30	3 26	3 50	4 20	5 9	5 39	5 58	5 45	5 27	5 9	4 50	4 29	4 14	3 56	3 38	3 26
5 0	3 32	3 56	4 26	5 15	5 45	6 4	5 51	5 33	5 15	4 56	4 35	4 20	4 2	3 44	3 32
5 30	3 41	4 5	4 35	5 24	5 54	6 13	6 0	5 42	5 24	5 5	4 44	4 29	4 11	3 53	3 41
6 0	3 52	4 16	4 46	5 35	6 5	6 24	6 11	5 53	5 35	5 16	4 55	4 40	4 22	4 4	3 52
6 30	4 1	4 25	4 55	5 44	6 14	6 33	6 20	6 2	5 44	5 25	5 4	4 49	4 31	4 13	4 1
7 0	4 8	4 32	5 2	5 51	6 21	6 40	6 27	6 9	5 51	5 32	5 11	4 56	4 38	4 20	4 8
7 30	4 15	4 39	5 9	5 58	6 28	6 47	6 34	6 16	5 58	5 39	5 18	5 3	4 45	4 27	4 15
8 0	4 18	4 42	5 12	6 1	6 31	6 50	6 37	6 19	6 1	5 42	5 21	5 6	4 48	4 30	4 18
8 30	4 19	4 43	5 13	6 2	6 32	6 51	6 38	6 20	6 2	5 43	5 22	5 7	4 49	4 31	4 19
9 0	4 18	4 42	5 12	6 1	6 31	6 50	6 37	6 19	6 1	5 42	5 21	5 6	4 48	4 30	4 18
9 30	4 15	4 39	5 9	5 58	6 28	6 47	6 34	6 16	5 58	5 39	5 18	5 3	4 45	4 27	4 15
10 0	4 10	4 34	5 4	5 53	6 23	6 42	6 29	6 11	5 53	5 34	5 13	4 58	4 40	4 22	4 10
10 30	4 6	4 30	5 0	5 49	6 19	6 38	6 25	6 7	5 49	5 30	5 9	4 54	4 36	4 18	4 6
11 0	4 0	4 24	4 54	5 43	6 13	6 32	6 19	6 1	5 43	5 24	5 3	4 48	4 30	4 12	4 0
11 30	3 54	4 18	4 48	5 37	6 7	6 26	6 13	5 55	5 37	5 18	4 57	4 42	4 24	4 6	3 54

* For the manner of using these tables see the example for San Francisco, pages 44–49.

TABLE III.

Days from moon's greatest declination.		SOUTH DECLINATION.			NORTH DECLINATION.			Days from moon's greatest declination.	
		Low water.	High water.	Low water.	Low water.	High water.	Low water.		
		h. m.	h. m.	h. m.	h. m.	h. m.	h. m.		
Before.	7	6 05	12 26	18 05	5 39	12 26	18 31	7	Before.
	6	6 38	13 14	18 20	5 06	11 38	18 16	6	
	5	7 18	14 14	18 40	4 26	10 38	17 56	5	
	4	8 13	15 52	19 23	3 31	9 00	17 13	4	
	3	8 36	16 52	20 00	3 08	8 00	16 36	3	
	2	8 43	17 30	20 31	3 01	7 22	16 05	2	
	1	8 12	17 04	20 36	3 32	7 48	16 00	1	
	0	7 40	16 28	20 32	4 04	8 24	16 04	0	
After.	1	7 18	15 52	20 18	4 26	9 00	16 18	1	After.
	2	6 59	15 14	19 59	4 45	9 38	16 37	2	
	3	6 38	14 32	19 38	5 06	10 20	16 58	3	
	4	6 24	14 02	19 22	5 20	10 50	17 14	4	
	5	6 10	13 26	19 00	5 34	11 26	17 36	5	
	6	5 59	12 50	18 35	5 45	12 02	18 01	6	
	7	5 42	12 26	18 28	6 02	12 26	18 08	7	

TABLE IV.

Time of moon's transit.	NORTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
Hour.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
0	6.6	6.3	5.9	6.1	6.4	6.9	7.2	7.4	7.5	7.5	7.5	7.5	7.6	7.7	7.9
1	6.7	6.4	6.0	6.2	6.5	7.0	7.3	7.5	7.6	7.6	7.6	7.6	7.7	7.8	8.0
2	6.6	6.3	5.9	6.1	6.4	6.9	7.2	7.4	7.5	7.5	7.5	7.5	7.6	7.7	7.9
3	6.3	6.0	5.6	5.8	6.1	6.6	6.9	7.1	7.2	7.2	7.2	7.2	7.3	7.4	7.6
4	6.0	5.7	5.3	5.5	5.8	6.3	6.6	6.8	6.9	6.9	6.9	6.9	7.0	7.1	7.3
5	5.9	5.6	5.2	5.4	5.7	6.2	6.5	6.7	6.8	6.8	6.8	6.8	6.9	7.0	7.2
6	6.1	5.8	5.4	5.6	5.9	6.4	6.7	6.9	7.0	7.0	7.0	7.0	7.1	7.2	7.4
7	6.4	6.1	5.7	5.9	6.2	6.7	7.0	7.2	7.3	7.3	7.3	7.3	7.4	7.5	7.7
8	6.5	6.2	5.8	6.0	6.3	6.8	7.1	7.3	7.4	7.4	7.4	7.4	7.5	7.6	7.8
9	6.5	6.2	5.8	6.0	6.3	6.8	7.1	7.3	7.4	7.4	7.4	7.4	7.5	7.6	7.8
10	6.6	6.3	5.9	6.1	6.4	6.9	7.2	7.4	7.5	7.5	7.5	7.5	7.6	7.7	7.9
11	6.6	6.3	5.9	6.1	6.4	6.9	7.2	7.4	7.5	7.5	7.5	7.5	7.6	7.7	7.9

TABLE V.

Time of moon's transit.	SOUTH DECLINATION.—DAYS FROM MOON'S GREATEST DECLINATION.														
	Before—								After—						
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7
Hour.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.
0	7.6	7.9	8.3	8.1	7.8	7.3	7.0	6.8	6.7	6.7	6.7	6.7	6.6	6.5	6.3
1	7.7	8.0	8.4	8.2	7.9	7.4	7.1	6.9	6.8	6.8	6.8	6.8	6.7	6.6	6.4
2	7.6	7.9	8.3	8.1	7.8	7.3	7.0	6.8	6.7	6.7	6.7	6.7	6.6	6.5	6.3
3	7.3	7.6	8.0	7.8	7.5	7.0	6.7	6.5	6.4	6.4	6.4	6.4	6.3	6.2	6.0
4	7.0	7.3	7.7	7.5	7.2	6.7	6.4	6.2	6.1	6.1	6.1	6.1	6.0	5.9	5.7
5	6.9	7.2	7.6	7.4	7.1	6.6	6.3	6.1	6.0	6.0	6.0	6.0	5.9	5.8	5.6
6	7.1	7.4	7.8	7.6	7.3	6.8	6.5	6.3	6.2	6.2	6.2	6.2	6.1	6.0	5.8
7	7.4	7.7	8.1	7.9	7.6	7.1	6.8	6.6	6.5	6.5	6.5	6.5	6.4	6.3	6.1
8	7.5	7.8	8.2	8.0	7.7	7.2	6.9	6.7	6.6	6.6	6.6	6.6	6.5	6.4	6.2
9	7.5	7.8	8.2	8.0	7.7	7.2	6.9	6.7	6.6	6.6	6.6	6.6	6.5	6.4	6.2
10	7.6	7.9	8.3	8.1	7.8	7.3	7.0	6.8	6.7	6.7	6.7	6.7	6.6	6.5	6.3
11	7.6	7.9	8.3	8.1	7.8	7.3	7.0	6.8	6.7	6.7	6.7	6.7	6.6	6.5	6.3

NOTE.—To use these tables with a chart on which the soundings are referred to mean low water, subtract 2.3 feet from the numbers in the tables for Port Townshend and 2.7 for Semiahmoo and Steilacoom.

TABLE VI.

Hours of moon's transit.	SMALL EBB TIDE, OR FROM SMALL HIGH WATER TO SMALL LOW WATER. Days from moon's greatest declination. Before—								After—							FROM SMALL LOW WATER TO LARGE HIGH WATER. Days from moon's greatest declination. Before—								After—							Hours of moon's transit.
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	
H.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	H.
0	4.5	5.6	6.9	8.0	8.6	8.9	8.8	8.8	8.7	8.7	8.5	8.0	7.3	6.6	5.5	3.5	3.9	4.6	6.0	7.2	8.4	9.0	9.5	9.6	9.4	9.2	8.7	8.2	7.9	7.1	0
1	4.5	5.6	6.9	8.0	8.6	8.9	8.8	8.8	8.7	8.7	8.5	8.0	7.3	6.6	5.5	3.5	3.9	4.6	6.0	7.2	8.4	9.0	9.5	9.6	9.4	9.2	8.7	8.2	7.9	7.1	1
2	4.4	5.5	6.8	7.9	8.5	8.8	8.7	8.7	8.6	8.6	8.4	7.9	7.2	6.5	5.4	3.4	3.8	4.5	5.9	7.1	8.3	8.9	9.4	9.5	9.3	9.1	8.6	8.1	7.8	7.0	2
3	4.1	5.2	6.5	7.6	8.2	8.5	8.4	8.4	8.3	8.3	8.1	7.6	6.9	6.2	5.1	3.1	3.5	4.2	5.6	6.8	8.0	8.6	9.1	9.2	9.0	8.8	8.3	7.8	7.5	6.7	3
4	3.5	4.6	5.9	7.0	7.6	7.9	7.8	7.8	7.7	7.7	7.5	7.0	6.3	5.6	4.5	2.5	2.9	3.6	5.0	6.2	7.4	8.0	8.5	8.6	8.4	8.2	7.7	7.2	6.9	6.1	4
5	3.1	4.2	5.5	6.6	7.2	7.5	7.4	7.4	7.3	7.3	7.1	6.6	5.9	5.2	4.1	2.1	2.5	3.2	4.6	5.8	7.0	7.6	8.1	8.2	8.0	7.8	7.3	6.8	6.5	5.7	5
6	3.1	4.2	5.5	6.6	7.2	7.5	7.4	7.4	7.3	7.3	7.1	6.6	5.9	5.2	4.1	2.1	2.5	3.2	4.6	5.8	7.0	7.6	8.1	8.2	8.0	7.8	7.3	6.8	6.5	5.7	6
7	3.3	4.4	5.7	6.8	7.4	7.7	7.6	7.6	7.5	7.5	7.3	6.8	6.1	5.4	4.3	2.3	2.7	3.4	4.8	6.0	7.2	7.8	8.3	8.4	8.2	8.0	7.5	7.0	6.7	5.9	7
8	3.5	4.6	5.9	7.0	7.6	7.9	7.8	7.8	7.7	7.7	7.5	7.0	6.3	5.6	4.5	2.5	2.9	3.6	5.0	6.2	7.4	8.0	8.5	8.6	8.4	8.2	7.7	7.2	6.9	6.1	8
9	3.7	4.8	6.1	7.2	7.8	8.1	8.0	8.0	7.9	7.9	7.7	7.2	6.5	5.8	4.7	2.7	3.1	3.8	5.2	6.4	7.6	8.2	8.7	8.8	8.6	8.4	7.9	7.4	7.1	6.3	9
10	4.1	5.2	6.5	7.6	8.2	8.5	8.4	8.4	8.3	8.3	8.1	7.6	6.9	6.2	5.1	3.1	3.5	4.2	5.6	6.8	8.0	8.6	9.1	9.2	9.0	8.8	8.3	7.8	7.5	6.7	10
11	4.4	5.5	6.8	7.9	8.5	8.8	8.7	8.7	8.6	8.6	8.4	7.9	7.2	6.5	5.4	3.4	3.8	4.5	5.9	7.1	8.3	8.9	9.4	9.5	9.3	9.1	8.6	8.1	7.8	7.0	11

TABLE VII.

Hours of moon's transit.	LARGE EBB TIDE, OR FROM LARGE HIGH WATER TO LARGE LOW WATER. Days from moon's greatest declination. Before—								After—							FROM SMALL LOW WATER TO LARGE HIGH WATER. Days from moon's greatest declination. Before—								After—							Hours of moon's transit.
	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	7	6	5	4	3	2	1	0	1	2	3	4	5	6	7	
H	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	Ft.	H.
0	6.5	5.4	4.1	3.0	2.4	2.1	2.2	2.2	2.3	2.3	2.5	3.0	3.7	4.4	5.5	7.5	7.1	6.4	5.0	3.8	2.6	2.0	1.5	1.4	1.6	1.8	2.3	2.8	3.1	3.9	0
1	6.5	5.4	4.1	3.0	2.4	2.1	2.2	2.2	2.3	2.3	2.5	3.0	3.7	4.4	5.5	7.5	7.1	6.4	5.0	3.8	2.6	2.0	1.5	1.4	1.6	1.8	2.3	2.8	3.1	3.9	1
2	6.4	5.3	4.0	2.9	2.3	2.0	2.1	2.1	2.2	2.2	2.4	2.9	3.6	4.3	5.4	7.4	7.0	6.3	4.9	3.7	2.5	1.9	1.4	1.3	1.5	1.7	2.2	2.7	3.0	3.8	2
3	6.1	5.0	3.7	2.6	2.0	1.7	1.8	1.8	1.9	1.9	2.1	2.6	3.3	4.0	5.1	7.1	6.7	6.0	4.6	3.4	2.2	1.6	1.1	1.0	1.2	1.4	1.9	2.4	2.7	3.5	3
4	5.5	4.4	3.1	2.0	1.4	1.1	1.2	1.2	1.3	1.3	1.5	2.0	2.7	3.4	4.5	6.5	6.1	5.4	4.0	2.8	1.6	1.0	0.5	0.4	0.6	0.8	1.3	1.8	2.1	2.9	4
5	5.1	4.0	2.7	1.6	1.0	0.7	0.8	0.8	0.9	0.9	1.1	1.6	2.3	3.0	4.1	6.1	5.7	5.0	3.6	2.4	1.2	0.6	0.1	0.0	0.2	0.4	0.9	1.4	1.7	2.5	5
6	5.1	4.0	2.7	1.6	1.0	0.7	0.8	0.8	0.9	0.9	1.1	1.6	2.3	3.0	4.1	6.1	5.7	5.0	3.6	2.4	1.2	0.6	0.1	0.0	0.2	0.4	0.9	1.4	1.7	2.5	6
7	5.3	4.2	2.9	1.8	1.2	0.9	1.0	1.0	1.1	1.1	1.3	1.8	2.5	3.2	4.3	6.3	5.9	5.2	3.8	2.6	1.4	0.8	0.3	0.2	0.4	0.6	1.1	1.6	1.9	2.7	7
8	5.5	4.4	3.1	2.0	1.4	1.1	1.2	1.2	1.3	1.3	1.5	2.0	2.7	3.4	4.5	6.5	6.1	5.4	4.0	2.8	1.6	1.0	0.5	0.4	0.6	0.8	1.3	1.8	2.1	2.9	8
9	5.7	4.6	3.3	2.2	1.6	1.3	1.4	1.4	1.5	1.5	1.7	2.2	2.9	3.6	4.7	6.7	6.3	5.6	4.2	3.0	1.8	1.2	0.7	0.6	0.8	1.0	1.5	2.0	2.3	3.1	9
10	6.1	5.0	3.7	2.6	2.0	1.7	1.8	1.8	1.9	1.9	2.1	2.6	3.3	4.0	5.1	7.1	6.7	6.0	4.6	3.4	2.2	1.6	1.1	1.0	1.2	1.4	1.9	2.4	2.7	3.5	10
11	6.4	5.3	4.0	2.9	2.3	2.0	2.1	2.1	2.2	2.2	2.4	2.9	3.6	4.3	5.4	7.4	7.0	6.3	4.9	3.7	2.5	1.9	1.4	1.3	1.5	1.7	2.2	2.7	3.0	3.8	11

Table of magnetic east declination on the Pacific coast of the United States for the year 1863.

Latitude N.	Longitude west.			
	110°.	115°.	120°.	125°.
°	°	°	°	°
30	11⅜	12	12	.....
31	12	12¼	12¼	.....
32	12½	12⅜	12¾	.....
33	12¾	13	13	13¼
34	13¼	13½	13¾	14
35	13½	14	14	14¼
36	.....	14¼	14¾	15
37	.....	14¾	15	15½
38	.....	15	15⅜	16
39	.....	15½	16	16½
40	.....	16	16⅝	17
41	.....	16½	17	17½
42	.....	17	17⅜	18
43	.....	17½	18¼	18¾
44	.....	18	18¾	19¼
45	.....	18⅜	19⅛	19¾
46	.....	19⅛	19¾	20⅛
47	.....	19⅝	20½	21
48	.....	20¼	21	21½
49	.....	20⅝	21½	.....

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