Geo Davidson

UNITED STATES COAST SURVEY.

BENJAMIN PEIRCE, Superintendent.

Rarebook
VK
947
.D4
1869
C.2

PACIFIC COAST.

COAST PILOT

OF

CALIFORNIA, OREGON,

AND

WASHINGTON TERRITORY.

BY

GEORGE DAVIDSON,
ASSISTANT COAST SURVEY.

1869.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1869.

National Oceanic and Atmospheric Administration

Climate Database Modernization Program

ERRATA NOTICE

One or more conditions of the original document may affect the quality of the image, such as:

Discolored pages
Faded or light ink
Binding intrudes into the text

This document has been imaged through the NOAA Climate Database Modernization Program. To view the original document, please contact the NOAA Central Library in Silver Spring, MD at (301) 713-2607 x124 or www.reference@nodc.noaa.gov.

LASON
Imaging Subcontractor
12200 Kiln Court
Beltsville, MD 20704-1387
March 28, 2002

Blank page retained for pagination

INTRODUCTORY.

Before the acquisition of California by the United States, 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.

In the following pages it is proposed to state all that is known at the present time of the Pacific coast of the United States, from the southern boundary of California, in latitude 32° 32′, to the northern boundary of Washington Territory, in latitude 49°, embracing an ocean shore-line of over three thousand one hundred and twenty miles, divided as follows: California, including the island of Santa Barbara Channel, one thousand and ninety-seven miles; Oregon, two hundred and eighty-five miles; Washington Territory, including islands in Washington Sound and shores of Puget Sound, one thousand seven hundred and thirty-eight miles.

Whatever has not come 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 known changes have taken place they will be stated.

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

Soundings are given for the mean of the lower low waters.

Bearings are magnetic.

Distances are expressed in geographical (nautical) miles.

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

Blank page retained for pagination

COAST OF LOWER CALIFORNIA.

Off the western coast, at irregular distances, there appears to be a range of submarine mountains, whose summits, rising occasionally above the water, form islands, and, nearing the surface at other points, form dangerous and extensive banks.

One of these last is a bank very similar to the Cortes Bank,* and, possibly, an extension of it to the southeastward of the latter, and designated the "Banco Cortes" on the French chart No. 1997. Upon the latest British Admiralty charts it is not noted. The shoalest part of the bank has ten fathoms upon it in three spots situated between latitudes 31° 33′ and 31° 43′, and longitudes 118° 44′ and 118° 52′, being nearly southeast by south quarter south, fifty miles from the Bishop Rock. But as more detailed examinations may discover such dangers as were found upon the original Cortes Bank, it will be well for navigators to avoid passing over the shoalest localities.

It lies in the direct route of the steamships running between San Francisco and Mexican ports and Panama, and, as laid down, is very extensive, the area within the twenty-fathom line being three thousand square miles, and within the fifteen-fathom line about one thousand five hundred square miles. The thirty-fathom line extends nearly ten miles outside the twenty-fathom line; whilst the deepest soundings between the bank and the bay of Todos Santos are only forty fathoms.

Upon the Spanish chart of 1863 of this coast the shoal is evidently laid down too far to the westward, and it is probable the same error may exist in the French chart, for in December 1860, no soundings were obtained upon it with two hundred fathoms of line. Through the enterprise of Captain Eldridge, agent of the Pacific Mail Company, and in concert with Captain Lapidge, of the steamer Golden Gate, on the voyage from San Francisco to Panama we ran a line of soundings thirty miles in length across the given locality. The weather was cloudy and no observations could be obtained after leaving San Francisco; but the departure of the vessel was obtained from the western point of the island of San Miguel, and a course laid across the assigned position of ten-fathom soundings. The sea was smooth so that we readily detected the ground swell on the edge of the Cortes Shoal, and when abreast of the "Banco Cortes" also felt a ground swell for a short time, but found no bottom, as above stated. The western edge of the bank may drop off more quickly than is indicated by the chart, and the vessel may have been set off shore by a current from the Santa Barbara Channel. We subsequently had no observations for position for some days.

This bank, with the islands northward, and the islands and rocks southward, affords another evidence of a submarine range parallel with the coast mountains.

---

* For description of the Cortes Bank see page 27.

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 fifteen miles south by east from Point Loma, about one and five-eighths mile in length by one-third of a mile in breadth, and lying in a northwest and southeast direction. It is a wedge-shaped mass, rising to about five hundred and seventy-five 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 fifty 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, and lies north 58° west from the larger, distant two and three-eighths 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 "Las Sergas of Esplandian," the son of Amadis of Gaul, written by Garcia Ordonez 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:

"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 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

* The full title of the book is "Las Sergas del Mey Esforzado Cabalero Esplandian hijo del excelente re Amadis de Gaula."

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 west-northwest two hundred and twenty-five miles; from Point Arguello to Cape Mendocino, in latitude 40° 25′, longitude 124° 22′, northwest five hundred and twenty five miles; from Cape Mendocino to Cape Flattery, in latitude 48° 23′, longitude 124° 44′, north-northwest four hundred and eighty 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, 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.	

From the boundary the coast is low and flat, running north by west for about seven 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 three hundred feet, and after stretching south for about five and a half miles, gradually increasing in height to four hundred and fifty-seven feet, terminates very abruptly. It is covered with coarse grass, cacti, wild sage, and low bushes.

POINT LOMA LIGHT-HOUSE.

This primary sea-coast light is less than half a mile from the southern end of the point, and situated upon its highest part, four hundred and twenty-two feet

Monument N. E. ½ E. (Compass) 3 miles

View showing Initial Point of Boundary between the United States and Mexico

Lt. Ho.
Pt. Loma

False Pt. False Bay

View. Pt. Loma bearing S.E. by S. (Compass)

above high water. The building consists of a stone dwelling of one and a half stories, with a low tower of plastered brick rising from the center sufficiently high to place the focal plane of the light four hundred and ninety-two 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 29 miles.

From a height of 20 feet above the sea, at a distance of 30½ miles.

From a height of 30 feet above the sea, at a distance of 31.7 miles.

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

	°	′	″	
Latitude	32	40	13.0	north.
Longitude	117	12	22.0	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′.

From the light-house station the islands of Santa Catalina, seventy miles distant, and San Clemente, fifty-eight miles distant, are distinctly visible in clear weather.

The English Admiralty Chart No. 2461, with corrections to March, 1865, has the Point Loma light erroneously placed on False Point, about seven miles northward of its true position at the entrance to False Bay.

SAN DIEGO BAY.

Next to that of San Francisco, no harbor on the Pacific coast of the United States approximates in excellence the bay of San Diego. It is readily distinguished, easily approached, and a depth of twenty-two 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 six hundred and fifty 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 twenty-five 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 twenty to ten fathoms. The field commences off the bar at the entrance to False Bay, and stretches southward two and three-quarters miles south of Point Loma. Mariners approaching the south end of Loma, along the outer edge of the kelp, should pass through a partial break in it, and when the point bears northeast by east, distant one and a half miles, keep along the northern edge of the kelp in four and a half 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 the lowest 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 having struck on 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 lie on the wind up to Ballast Point, off which four fathoms can be carried within a ship's length, with ten 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 four to ten fathoms, with good holding ground. Inside the point, and about two hundred and fifty yards north by west from it, is a shoal having only twelve 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.

---

* Or Punta de los Guijarros.

† Named by Viscaino in 1620. Don Gaspar de Zuniga, Count de Monterey, dispatched the expedition.

TIDES AT SAN DIEGO.

General remarks upon the nature of the tides will be given when discussing the tides at San Francisco.

The corrected establishment or mean interval between the time of the moon's transit and the time of high water at La Playa is 9*h.* 38*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 the height of these two tides is 1.5 feet 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 seven and a quarter 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 two tides of the same day are generally unequal in proportion to the moon's declination. The time and height can be obtained approximately from the following table:

Moon's declination.	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High water.		Low water.		High water.		Low water.	
	Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
	H. M.	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*
Greatest north	8 53	5.6	16 16	—0.3	10 23	3.7	14 58	2.1
Zero	9 28	4.9	15 40	0.7	9 28	4.9	15 40	0.7
Greatest south	10 23	3.7	14 58	2.1	8 53	5.6	16 16	—0.3

The interval is to be added to the time of the moon's meridian passage to give the time of high or low water. The time of the moon's upper meridian passage is given in the almanac, and the time of its lower meridian passage is the middle between two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest low waters; to which level the soundings on the chart are given.

Spring Tides.—At the full and change of the moon the high waters will be 0.7 foot higher than the above, and the low waters 0.7 foot lower.

Neap Tides.—At the moon's first and last quarters the high waters will be 0.7 foot lower, and the low waters will not fall as low by 0.7 foot.

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 northwest and southeast 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, one hundred and ninety-four feet high, and a quarter of a mile west-southwest 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 river flows into San Diego Bay, which is represented as shoaling at that point.

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 six hundred and thirty-five 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.

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′ north, 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 caution. 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 northwest 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 Pérouse (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 north by west half west, distant five and a half 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.

To the north and west of this the shore is compact and unbroken, except by

the valleys of San Luis Rey and San Juan Capistrano. The waters off this stretch of the coast were called by Vizcaino 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 north by west for twenty-two miles; thence to Point Lausen, (of Vancouver, 1793,) forming the east point of San Pedro Bay, northwest by west half west nearly sixty miles.

SAN LUIS REY.

The mission of San Luis Rey was the largest in California; it was founded June 13 1798; stands in a rich valley from one to two miles wide; is about three miles from the ocean, being separated therefrom by a range of hills; and the number of domesticated Indians formerly in its neighborhood gave it the appearance of a large and thriving settlement.

It is nearly in the centre of a section of country unequaled 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 rarely visited. Its position on the coast will be seen by reference to the chart of the Coast Survey.

Its approximate geographical position is:

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

SAN JUAN CAPISTRANO

is now a place of no importance, with an unprotected anchorage, rocky bottom, and bad landing. The bay has a high cliff-like head to the northwest but terminates in low sandy beaches to the southward.

It is situated in a fine valley, and its site is marked on the chart of the Coast Survey.

The approximate geographical position of the anchorage as determined by the United States Coast Survey is:

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

In latitude 33° 30½′ north, 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.

View of San Pedro, Pt. Fermin bearing W. N.W. (Compass) 4 miles

View, Pt. Duma bearing East (Compass) 10 miles

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 sixty feet in height.

Vessels coming from the westward through the Santa Barbara Channel make San Pedro Hill, (1,600 feet high,) 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 fifty to eighty fathoms within a mile of the shore; round Point Fermin within half a mile, in from six to ten 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 and go to sea should a heavy southeaster spring up. In 1852 we saw the clipper brig Fremont ride out a very heavy southeast gale of three days' duration.

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 two hundred 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." The town of Wilmington is situated three miles inside the bar, and has a good wharf and large storehouses to receive freight. There are two steam tugs and five lighters for receiving and delivering freight to vessels in San Pedro Bay.

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

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

*Named by Vancouver in 1792, after Fermin de la Suen, the Father, president of the Missions of Alta California. "A low point forming the east point of a small bay or cove in the southeast part of San Pedro Bay" he named Point Lasuen after the same person.

†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.

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 south by west quarter west, 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 9*h.* 39*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 twenty-two miles north by the road, from San Pedro, and is the centre of an extensive grazing, agricultural, and grape-growing country.

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 six hundred yards in length by two hundred in width.

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.

In 1861 a preliminary examination was made of the lagoon, situated east quarter south, about fifteen or sixteen 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 fifty yards in width,

with a narrow bar, upon which it is supposed ten or twelve 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. The attempts to pass the bar were, in all cases, attended with risk, and the entrance may, for general purposes be regarded as impracticable.

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

Anaheim Landing is situated at the opening into the northwest part of a long lagoon, and is used by steamers to land and receive freight for Anaheim, which lies twelve miles northeast therefrom. This landing is between ten and eleven miles east three-quarters north from El Moro or Deadman's Island; and the bar to the lagoon is said (1868) to have two or three feet of water upon it at low water.

*From Point Vincente** the coast trends north by west three-quarters west for seventeen miles; thence west by south to Point Dume, in latitude 34° 00′ north, and longitude 118° 41′ west; thence to Point Mugu, west half north for seventeen miles. The last point lies northeast by east one-third east, distant fourteen 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 two hundred and two 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.

From Point Mugu to San Buenaventura, distant seventeen miles, the coast has a general trend northwest by west; but, about midway, it curves southwestward of this course two and a half miles toward 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 ten-fathom line running within two hundred and fifty 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

* Named by Vancouver in November 1793, after Vincente Sta. Maria, one of the friars of the Mission of Buenaventura.

† Named by Vancouver, in November, 1793, after the Father Francisco Dume, one of the friars of the Mission of Buenaventura.

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 Islands, 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 half-way between Mugu and Buenaventura. From Anacapa, Point Hueneme bears northeast by north one-third north, distant nine and a quarter miles. The best landing is directly on the point. Landing in the bight to the eastward and leeward is impracticable. Directly off this point is found a remarkable example of a submarine valley, commencing with a depth of ten fathoms, four hundred yards from the beach, increasing to fifty fathoms in five-eighths of a mile, and to one hundred and thirteen in less than two miles. Its general direction is south, with a width of a mile, and bounded on either side by depths of twelve and fifteen fathoms.

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 ten 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 half a mile from the shore, was founded March 31, 1782. Its approximate geographical position is:

	° ′
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 sixty per cent. Around the locality are found ashes and scoria. The ground is hot, and the gas emitted is almost suffocating. On the head waters of the Santa Clara River and the Arroyo Simi, are petroleum springs.

SANTA BARBARA.

From San Buenaventura to Santa Barbara the distance is twenty-three miles, and the bearing nearly west by north.

Santa Barbara is an open roadstead for all, except northerly winds, which are

Lt.Ho.

View of the Town and Mission of Santa Barbara

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 three and a half fathoms, hard bottom. In anchoring far enough off to get nine or ten fathoms the bottom will be found sticky. A hydrographic sketch of the vicinity was published by the Coast Survey in 1855.

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 it and drive it shoreward in such vast quantities that, coming across a vessel's hawse, it helps to bring home her anchors.

LIGHT-HOUSE AT SANTA BARBARA.

The structure consists of a plastered dwelling of one and a half stories, with a low gray 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 one hundred and eighty feet above the sea, two miles southwestwardly from the landing on the beach, and one hundred and eighty-three 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 ten feet at a distance of nineteen miles; from a height of twenty feet at a distance of twenty and a half 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 35.41 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′.

* Named by Vancouver in November 1793, after the commandant of the presidio of Sta. Barbara, Señor Don Felipe Goycochea. It is called Point Castillo on the Coast Survey chart of 1853, from a small Mexican battery formerly existing upon it.

The secondary astronomical station of the Coast Survey was on the slight grassy rise just in from the beach, and sixty 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.

Santa Barbara is a town of considerable size, lying in the middle of an agricultural tract of limited breadth running east and west, at the southern base of the Sierra Concepcion. 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 have been cultivated with success.

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 or 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 plentiful, but not so readily procured.

A very short distance back from the coast line is a range of rugged hills, over two thousand 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 one thousand two hundred 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 fifteen or twenty 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 the

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 west by south, distance thirty-seven miles. The rugged hills westward of the Gaviota Pass come close to the shore, forcing the traveler to leave the beach for their sea slope, the trail passing over steep ridges and across sharp valleys.

The sandstone terraces of the immediate vicinity are about eighty feet high at the Gaviota Pass and dip at an angle of forty degrees into the sea, forming a bulwark of natural masonry against further encroachments. This elevated terrace continues from Santa Barbara to Point Concepcion. In this distance it is cut by numerous arroyos running down from the mountains. There is only one pass between the River Buenaventura and Point Concepcion, and that is the Gaviota, which at its summit at Santa Cruz is seven hundred feet above the ocean.

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 at or near 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.

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 two hundred and twenty 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 two thousand five hundred 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.

LIGHT-HOUSE AT POINT CONCEPCION.

The buildings are erected on the extremity of the cape and upon the highest part, which is two hundred and twenty 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 stories, with a low tower, also of brick, and plastered white, rising from the center. 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 two hundred and fifty 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.

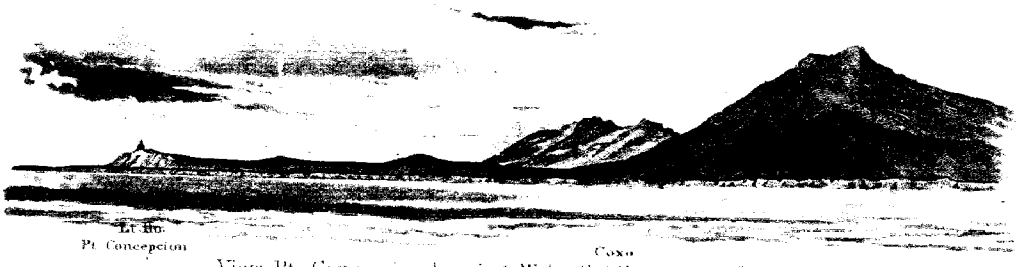
Its geographical position, as given by the Coast Survey, is:

	° ′ ″	
Latitude	34 26 46.6	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 three thousand one hundred and thirty-six pounds, is placed on the edge of the bluff, seaward of the light-house. The striking machin-



View, Pt. Concepcion bearing W. by S. (Compass) 3 miles

View, Pt. Concepcion bearing S. E. by E. (Compass) 12 miles

ery 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, south half east, distant twenty-two miles.

The east end of San Miguel Island, southeast by south quarter south, distant twenty-six miles.

The southwest end of Santa Cruz Island, southeast by east half east, distant forty 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.

The general set of the off-coast current is in the direction of the coast line towards the southeast. The larger mass of the great Japan Warm Stream that reaches the American coast about latitude 50°, sweeps southward along the shores with an average breadth of three or four hundred miles, and a rate of about sixteen miles per day. On March 24, 1815, the brig Forester, of London, in latitude 32° 45′, and longitude 126° 57′, only three hundred and fifty miles southwest by west from Point Concepcion, rescued three dying men (the captain and two sailors) on a Japanese junk that had drifted for seventeen months across the Pacific. She left the port of Osaca, was almost immediately surprised by a storm in which she lost her rudder and a mast, and in this condition had remained until succored. She lost thirty-two men.

During some summer seasons the fog is almost constant, 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 a thousand or fifteen hundred 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 sometimes 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° north. It was afterwards named Punta de la Limpia Concepcion.

The extent of shore-line from the southern boundary to Point Concepcion is about two hundred and fifty 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, vessels may run east by north, and gradually round the bluff one mile distant from the cape, giving it a berth of half a mile; then run on a north-northeast 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 two hundred and fifty and three hundred yards west half south 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 seventy-two miles 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 seventy miles southeast of Point Concepcion, instead of twenty-three miles southeast by south half south. 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 twenty miles by fifteen, and running north, whilst two others rival it in extent. 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.

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 north 55° west, or north 60° west 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 and extraordinary conditions of the refraction of the atmosphere, the island of San Clemente, invisible under ordinary conditions of refraction, 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. 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 are almost inaccessible, and San Nicholas and San Clemente are 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, 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 west by north from the last named, 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 Concepcion 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 northwest by west, 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′ north, the trend of the coast and hills southward, through the longer axis of Point Loma, will pass through Los Coronados, although the islands lie northwest 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." The smell of this asphaltum appears to be occasionally experienced quite far from the land.

Among the islands, as far as San Nicolas, the current runs to the southward. On the Cortes Shoal it frequently runs against the northwest 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 is published by the Coast Survey.

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 fifteen inches, but some seasons are marked by excessive drought. During the winter southeast gales prevail, and sometimes during the summer months southerly weather will bring up heavy rain.

ISLANDS, SHOALS, AND ROCKS.

CORTES BANK.*

Commencing at the southward, the first object that claims our attention is the dangerous bank and rock called the Cortes Bank, bearing southwest quarter west from the southeast end of the island of San Clemente, and distant forty-six 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 fifty-fathom curve the general trend is parallel with the islands of Santa Catalina, San Clemente, and San Nicolas, and it stretches about seventeen miles, from latitude 32° 24′ north, longitude 118° 59½′ west, to latitude 32° 32′ north, longitude 119° 17½′ west, but curves slightly to the southwest. It has an average and nearly uniform width of three and a half 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 two and a half fathoms of water upon it. Around this danger the depth increases gradually, and in an extent of two and a half miles in the general direction of the bank reaches but fifteen fathoms. The geographical position of these rocks is, approximately:

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

* For an extension of this bank to the southeastward see another page.

From the northwest end of the island of San Nicolas the rock bears southeast half south, distant fifty-seven miles; and from the southeast end of the island of San Clemente it bears southwest quarter south, distant forty-six miles.

From the Bishop Rock to the west end of San Miguel Island the course is northwest quarter west, and distant one hundred and fifteen miles.

The next shoal spot is one of ten fathoms, about the middle of the bank, and of limited extent, being only half a mile square within the fifteen-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 southeast by south, distant fifty-four miles; and from the southeast end of San Clemente it bears southwest quarter west, distant fifty miles. From the Bishop Rock it bears west quarter north, distant five miles.

To the northwestward of this latter shoal spot the depth is nearly uniform at forty-nine fathoms for seven and a half miles, and between it and the Bishop Rock the depth is uniform at about forty-three fathoms.

Upon this bank the current is variable, frequently setting against the strong northwest 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, United States navy.

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 forty-two fathoms to nine, 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, 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 ten-fathom spot was found, and the surveying schooner, under command of Lieutenant T. H. Stevens, United States navy, 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, (afterwards Gray 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 one hundred and thirty 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 the land gradually falling to the northward.

The general trend of the island is northwest by west; its length twenty and a half miles, with an average breadth of two miles, and fifty miles in circuit.

The southwest point of the island bears west half south from Point Loma, distant sixty 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 twelve fathoms, (on the line of a large rocky islet at the northwest side to a point east by south,) to four and five fathoms close in shore. Kelp will be found in ten fathoms, but the bottom is tolerably regular and hard. It is anything but a pleasant or safe anchorage in bad northwest 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.

Two or three miles southeast of this anchorage, on the eastern side of the island, another is laid down on the Coast Survey chart.

Under the southeast end of the island anchorage may be had in the deepest part of the indentation, called Smuggler's Cove, but the bottom is rocky and irregular. The southeast 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 west by north half north, one and three-quarters mile inside the kelp, in ten to fifteen 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 ten to thirty 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 thirty-six to one hundred and thirty 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 south 17° east from the north point of the rock islet before mentioned. Its geographical position is:

		° ′
Latitude	(approximate)	33 02 north.
Longitude		118 34 west.
		h. m. s.
Or, in time		7 54 16.0

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.

In 1862 the following report was made upon the condition of the island: "The entire surface of the island is broken by gulches, without a vestige of wood or a drop of running water. No inhabitants reside upon it, nor were any animals found except about one hundred and fifty wild sheep. The highest point of the island is estimated at about one thousand five hundred feet."

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. It is distinctly visible in clear weather from Point Loma light.

ISLAND OF SANTA CATALINA.

This island is seventeen and a half miles long, with an average breadth of four miles to the southern part, and two miles to the northern, while the shore-line amounts to about forty-two miles. It rises to a height of about three thousand 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 thirty 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 general trend of the island is west by north three-quarters north.

The depression in the island bears south-southwest from Point Fermin (San Pedro) and is distant eighteen and a half miles.

The harbor or cove on the southern side, five miles from the northern end, is only one-third of a mile in width, but its approaches are bold, and, so far as known,

View of Catalina Harbor

free from hidden dangers. To find it, run along the southwest 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 northwest, 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 center and two large outlying rocks. A steamer could run in on the west side of the rocks, and anchor off the low beach in ten fathoms, when the reef would lie north by east from her, distant an eighth of a mile. Small craft will here find protection from the prevailing winds, but will experience difficulty in getting out, as there is always a swell setting in, and the wind blows in flaws and eddies around the high hills. Between the two points forming the anchorage the distance is half a mile, and the depth one-third of a mile.

The soundings around the island show bold water, from nineteen to seventy-five 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 northeast to southwest, 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 northwest extremity of the island and the great break there is a spring of good water, and at the southeast 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 fire-wood, and a growth of thorny bushes covers the whole island, rendering traveling 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 south 25° west. Its geographical position is:

	° ′ ″	
Latitude	33 26 34.7	north.
Longitude	118 28 45	west.
	h. m. s.	
Or, in time	7 53 55.0	

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 Vizcanio in Decem-

ber 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 Ascencion, 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.

This island is distinctly visible in clear weather from Point Loma light.

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 halfway between them. From the north end of Santa Catalina it bears west by south, distant twenty-three miles.

The extent of the island would not exceed two miles of shore-line; its elevation at the highest part is about five hundred 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 six hundred 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 west-northwest; its length is eight miles, with an average and nearly uniform width of three and a half miles, whilst the extent of shore-line is about twenty-two miles.

The north point of the island bears southeast by east from Point Fermin, distant sixty-seven 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 ten to forty-eight fathoms.

Off the southeast point, which is low and sandy, vessels may anchor in ten 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 11.6	north.
Longitude	119 25 00	west.
	h. m. s.	
Or, in time	7 57 40.0	

This island was not seen by Vancouver in 1793.

It was examined by the early fur traders of the United States, and on account of the great number of sea-otters found there was known by the name of Sea-Otter island, and its south point placed in latitude 33° 17′, longitude 119° 10′.

The *Begg Rock* is situated on the prolongation of the longer axis of the island of San Nicolas, bearing northwest by west half west from its nearest (northwest) point, and distant seven miles. The rock is about forty 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 reconnoissance published by the Coast Survey.

ISLAND OF ANACAPA.

This is, in fact, a curiously formed group of three islands, extending in a nearly east-northeast direction, their entire length being five miles. The west end of Anacapa is a peak nine hundred and thirty 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 five hundred yards wide, whilst the eastern island is little over a mile long by five hundred yards wide. The gap separating the middle and eastern islands is over two hundred 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 four and a half miles east half north from the eastern point of the island of Santa Cruz. The depth of water between these islands is thirty fathoms, with a very regular bottom composed of gray sand, coral, and shells. The eastern end of the island bears southeast three-

quarters east from the Santa Barbara light, distant twenty-eight miles, and from Point Hueneme or Conversion, the nearest point of the mainland, southwest by south one-third south, distant nine and a quarter miles.

Anacapa is in latitude 34° 01′ north, and between longitudes 119° 19′ and 119° 24′ west. 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 gray sandstone, very rotten and crumbling. The sides are perpendicular, and from two hundred and fifty to three hundred 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. 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 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 Conception, 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 twenty miles. Its general direction is east and west, with a length of twenty-one miles and an average width of four miles, while the extent of its shore-line is not less than fifty-three miles.

On the northern side of the island, and near the middle, the shore makes a moderately deep curve, forming a roadstead called *Prisoners 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 fifteen 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.

Two miles off the south side of the eastern end of the island anchorage is laid down on the recent Coast Survey charts in nine fathoms, over a bottom of broken shells. In this position the east end of the island bears northeast three-quarters east, distant three and three-quarters miles, and the west end of Anacapa bears north half east, distant five and a half miles; another anchorage is laid down at the southeast part of the island in a small cove open to the south. It is nearly two miles northwestward of a large outlying rock, and from it the east end of Santa Rosa bears southwest three-quarters south, distant six miles.

The soundings around the island give 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 one thousand seven hundred 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 09.8	north.
Longitude	119 40 00	west.
	h. *m.* *s.*	
Or, in time	7 58 40.0	

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

East point of Santa Cruz Island southeast two-thirds south, distance twenty-four miles.

Prisoners Harbor south by east half east, distance twenty-two miles.

West point of Santa Cruz Island south by west half west, distance twenty-one 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 Prisoners 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 forty-two 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. Anchorage is laid down on the recent Coast Survey charts about the middle of the Five-mile Bight on the northeast side of the island. A depth of eleven fathoms is given when the west end of Santa Cruz bears northeast by north three-quarters north, distant eight miles. Another anchorage is laid down on the southeast face of the island in a small cove open to the east-southeast, with a low sand point, forming the south point of the cove. It is between four and five miles southwest by west from the east point of the island.

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. It is not so high as Santa Cruz, but attains an elevation of one thousand one hundred and seventy-two feet. 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 reconnoissance chart of the Coast Survey.

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 Brabara 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 most western of the Santa Barbara Channel Islands, having its longer axis lying east half north, and seven and one-half miles in length, with an average breadth of two and a half miles. The extent of shore-line is twenty-one miles. Its western extremity is bold and narrow, gradually increasing in breadth until it attains three and a half 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 thirty to thirty-seven fathoms water are found close in shore. On the northeast side of the island is the small bay called Cuyler 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 southwest. 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 southwest 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 east by south.

Southwest by south half south 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 harbor.

A hydrographic sketch of Cuyler Harbor was published by the Coast Survey in 1852.

The western point of the island bears south by east quarter east, distant twenty-five miles from Point Concepcion, and southeast by south half south, distant thirty-five miles from Point Arguello.

From the west point of San Miguel Island the Bishop Rock bears southeast quarter east, distant one hundred and fifteen miles.

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.

The Coast Survey secondary astronomical station is on the southwest

part of Cuyler Harbor, about forty feet up, on the side-hill. Its geographical position is:

	° ′ ″	
Latitude, (approximate)	34 03	north.
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 9*h.* 25*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 feet 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 seven and a half 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 Harbor.

San Miguel was discovered by Cabrillo in 1542, and Cuyler 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 Harbor was named by the United States Coast Survey in 1852, after Lieutenant Cuyler, United States navy.

Two rocks, showing themselves well above water, lie northwest by west from the western extremity of San Miguel, the larger being distant five miles. It bears south half east, distant twenty-two miles from Point Concepcion, and south-southeast, distant thirty 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. These rocks are designated as Richardson's Rocks on recent English charts. A rock above water is laid down two and a half miles north by west quarter west from the western point of San Miguel. It has deep water close to it, and on recent English charts is designated as Wilson's Rock. The total extent of shore-line of the Santa Barbara Islands is about two hundred and thirty-two miles.

Pt. Arguello

View Pt. Arguello bearing S.S.E. (Compass) 4 miles

Pt. Sal

View of Pt. Sal bearing N. by W. (Compass) 4 miles

FROM POINT CONCEPCION, NORTHWARD.

The first headland to the northward of Point Conception is Point Arguello,* distant twelve miles, and bearing northwest by west half west. The shore is bold and compact, curving slightly to the eastward between the two points, and the mountains immediately behind are not less than three thousand 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 four hundred and fifteen persons perished.

From this point the trend of the coast is northwest to Point Reyes, two hundred and forty miles distant, passing tangent to Point Sur in latitude 36° 19½′ north, and inside the South Farallon off San Francisco.

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; in Tebenkoff's collection of charts, 1848, it is 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 fifteen 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 south-southwest. This is known on the coast as Point Pedernales, signifying Point of Flints, but frequently 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 north by west two-thirds west, and distant nineteen miles, is Point Salt, see view, which is marked by streaks of yellow sandstone, except at the extreme point. It is a bold, mountainous headland, marked by several dark, sharp, rocky hills several hundred feet high, from one to three hundred yards from the point. The ridge stretches inland nearly east, increasing in height for four or five miles with alternate ridges and valleys, the ridges being from eight hundred to one thousand two hundred feet high. The side of this mountain spur protects the anchorage, and presents to the south a great wall, which extends north 78° east for one and five-sixteenths miles, to the opening of a slight valley marked by a few bushes, and near the northern part of a half-mile stretch of sand beach guarded by constant rollers.

The three-fathom line stretches three hundred and twenty yards southwest from the point and is marked by breakers. The "outer breaker" lies five hun-

*Named by Vancouver in November 1793.

†Named by Vancouver in November 1793, after the commandant of the Presidio of San Francisco.

dred and sixty yards south, 55° west, from the point, with ten fathoms close to it except on the east side. A rock and heavy breakers lie south four hundred and thirty yards from the point, and between these and the outer breaker is an occasional break on a rock with twelve feet water. The south end of "Seal Rock," (an islet forty-five feet high and nearly one hundred yards in extent,) lies south 60° east, seven hundred yards distant from the westernmost part of Point Sal; but the north side of the islet is only two hundred yards off the nearest shore, with three fathoms between them. Two hundred yards off the southwest face of the islet are constant breakers and a rock, besides several sunken rocks, having but two to four feet upon them. Along the south face of the point a depth of three fathoms is found within one or two hundred yards.

The curve in the coast under Point Sal is about three-quarters of a mile deep and two miles across, with soundings in seven fathoms, over a very uniform bottom of hard gray sand; a depth of twelve fathoms is found from half to one mile off shore.

The roadstead forms tolerably good shelter from the prevailing northwest winds, but is always subject to a very heavy swell with them. It is broad open to the southerly winds and swell. The best anchorage is in seven fathoms water, about five hundred yards south 78° east from the north side of Seal Rock, with the extreme end of Point Sal just open; bottom, hard gray sand.

This roadstead was surveyed in 1867, and a chart of it published in 1868, by the Coast Survey.

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 trend hence is north, until the coast 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′ north, and crosses the meridian of 121° 30′ west in latitude 33° 55½′ north. 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 lateral 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 southwest 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 north by east 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.

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 north 70° east 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 was 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 10*h.* 8*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 feet 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 from 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.

The northwestern part of this mountain, though cut by deep gulches, is very plainly marked by three terraces, each of several hundred feet in height. No other point of the coast is so decidedly marked.

We have been informed by old otter hunters on this coast that there exists a sunken rock about eight miles south-southwest 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. On Tebenkoff's chart is placed a "doubtful island from Spanish charts" fifty-one miles south 69° west. One of the Pacific mail steamships lay 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 west-northwest 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, 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 northwest point of the bay is called Punta de los Esteros on the old Spanish charts, and bears northwest half north from the west point of Mount Buchon, distant thirteen miles. A line joining these two points shows that the bay is about five miles deep.

From Point Arguello, Punta de los Esteros bears northwest by north, distant fifty-three miles.

From Point Los Esteros to the western point of the anchorage of San Simeon the coast runs nearly straight northwest by west for a distance of fifteen miles. The shores are not so bold as to the southward or northward, and the mountains

View of Moro Rock, Estero Bay, N. by E. (Compass) 10 miles

View of Piedras Blancas W. ¾ N. (Compass) 4 miles

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 northwest by west from Point Esteros, and is distant fifteen miles. The indentation of the shore-line forming the bay trends between north-northwest and north 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. The high hills behind this shore are marked by redwood trees along their crest line, and upon some of their flanks.

Vessels coming from the northward may run boldly round the southwest 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. About eight miles south of the Piedras Blancas is a three-mile stretch of timber upon the low rolling ridge bordering the shores. And two miles northward of this timber is another, but smaller, extent of wood. These are good marks, but 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 carrried 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 west three-quarters north of the southwest 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. When the outer rock bears north-northwest about two miles distant, it bears a very striking resemblance to a *lion couchant*. 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 northwest three-quarters west, distant thirty-eight miles.

From Point Esteros they bear northwest by west half west, distant eighteen miles.

From Point Arguello they bear nothwest half north, distant seventy-two miles.

The secondary astronomical station of the Coast Survey at San Simeon is on the rise just off the beach, and bearing north 5° west from the southwest 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.

Nearly half way between the west point of San Simeon Bay and the Piedras Blancas a small contracted anchorage is laid down on the Coast Survey chart.

From Piedras Blancas the coast trends northwest half west for a distance of fifty-seven miles, in an almost perfectly straight line. At a distance of eighteen 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′ north; but applying the correction obtained from his erroneous determination of San Diego, we obtain 35° 50′ north 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.

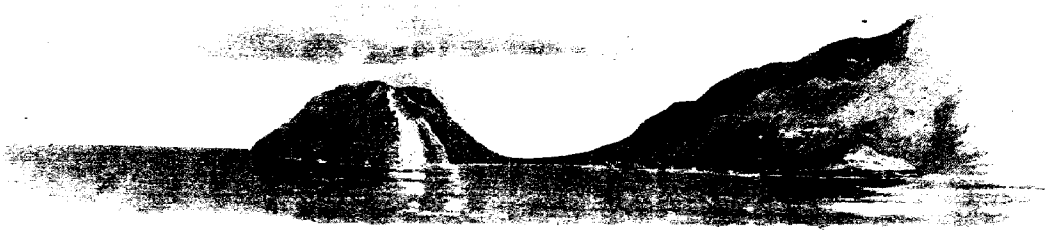
Continuing on the same bearing, and at a distance of forty-nine miles from Piedras Blancas, is Point Sur, sometimes called Lobos, making out nearly half a mile. As seen from the north or south, at a distance of ten miles, Point Sur appears as a high, large, round-topped island; but upon approaching it 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 four thousand four hundred and fourteen feet.

Still continuing on the same bearing, fifty-seven miles from Piedras Blancas and seven and a half miles from Point Sur, another slightly projecting point is passed, about a mile to the eastward of the course. Thence the coast trends more



Pt. Sur

View of Pt. Sur bearing N.N.W. $\frac{1}{4}$ W. (Compass) 4 miles

Lt. Ho.
Pt. Pinos

View of Pt. Pinos N. $\frac{3}{4}$ E. (by compass) 5 Miles

to the eastward, running north-northwest for eight miles to Point Cypress, and passing Point Carmel, the point south of Carmel Bay.

From Point Arguello to Point Sur, the bearing is north 44° west, and the distance one hundred and twenty miles. From Point Sur to Punta de los Reyes the bearing is north 43° west, and distance one hundred and eighteen miles.

The mountains, which had fallen back behind Los Esteros, now gradually approach the shore-line north of San Simeon; and about ten 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 four thousand feet. These mountains were called by Cabrillo the "Sierras Atlas," 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 in certain directions from the water. 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 Viscaino, in December 1602.

From Point Cypress to Point Pinos the general direction of the shore is north three-quarters east, and the distance four miles.

POINT PINOS.

This cape 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 ten or fifteen fathoms, and at a mile reaches forty or

forty-five 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.

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 gray-granite dwelling, one story in height, surmounted by a tower and lantern, which is thirty-five 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 ninety-one feet above the level of the sea. During ordinary clearness of the atmosphere it can be 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 51.8	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.

The general coast chart from Point Pinos to Bodega Head gives all the topographical and hydrographical characteristics of the coast. It was published by the Coast Survey in 1862.

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 north 27° west, nineteen and three-eighths miles, and the greatest width of the bay, near the mouth of the Salinas River, is nine and three-eighths miles.

From Point Pinos to the anchorage off the town of Monterey the course is east by south half south, 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 ten miles along this beach the line of three fathoms lies at a distance of one hundred and fifty 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 southeast by east course about fifteen miles will bring vessels into twenty-five fathoms, and nearly two miles from the beach; thence a south course for eight miles will bring them to the anchorage in ten fathoms, and half a mile from the landing. These precautions are necessary, because Point Pinos, with the whole bay, is frequently enveloped in a dense fog. Very often the coasting steamers have to run for the beach, and then be guided by the rote to the anchorage. La Pérouse says he heard the rote when one league off the shore.

A direct course from Point Año Nuevo to the anchorage is southeast half east, and the distance thirty-six and a half miles. From Point Pinos to Point Año Nuevo the bearing is north 47° west, and the distance thirty-four 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 fifteen to three fathoms in a distance of three hundred 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 11 north.
Longitude	121 52 27 west.
	h. m. s.
Or, in time	8 07 20.8

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is 10*h.* 12*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 sixteen thousand gallons of oil (which sold for twelve thousand dollars) 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 last 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 nine and a half miles from Monterey, and only one hundred yards from the beach. From Point Pinos it bears northeast by north quarter north, distant eight and a half miles. From this bend the river follows the line of the beach, just inside of the low sand dunes, for a distance of four and a half miles, and then disembogues. From Point Pinos it bears north by east five-eighths east,

and is distant twelve and three-quarters miles. This river has been designated by a variety of names—as Buenaventura, Monterey, and Salinas; but it is now generally known by the last name. It rises in the latitude of the Piedras Blancas; one branch about twenty and the other thirty-three 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 sixty yards wide at low water, to the entrance to the *Rio del Pajaro*, or San Antonio, the distance is two and a quarter miles; the shore trending to the north-northwest. The entrance of that river bears north by east, fourteen miles from Point Pinos.

From here the coast runs northwest nearly straight to Atos Creek, a distance of seven or eight miles, and about six miles east by north 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 submarine valley, similar to that off Point Hueneme, has been discovered, and to some extent traced out in this bay by Lieutenant Commanding (now Commodore) James Alden, United States navy. The head of this valley is five-eighths of a mile south of the mouth of the Salinas River, and the twenty-fathom line is only a quarter of a mile off the beach, the depth increasing to fifty fathoms, in the next quarter of a mile. At this distance from shore the twenty-fathom lines are three-eighths of a mile apart. The general direction of the valley for the next two miles is southwest half west, where we find a depth of one hundred and seventeen fathoms, and the fifty-fathom lines lie about five-eighths of a mile apart; thence the valley runs about west, reaching a depth of one hundred and seventy fathoms in a mile, and two hundred and forty fathoms in three and a quarter miles, with forty-two 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 ten miles of its length, it runs south 60° west, with no bottom at three hundred and fifteen fathoms. The only available boat landing upon the beach of the bay shores is at the head of this submarine 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 the plateau of the San Bruno Mountains. This valley is said to be nearly ninety miles in length, and in breadth varying from two to ten. It contains some two hundred thousand 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 dispatched the expedition.

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′ north, about half-way between the great bend and mouth of the Salinas River, and crosses the meridian of 123° 0′ west, in latitude 36° 36′ north. 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 one and half miles east and west.

Vessels coming from the northward, after leaving Point Año Nuevo, follow the coast-line on a general course east-southeast for about eighteen 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 six to ten 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.

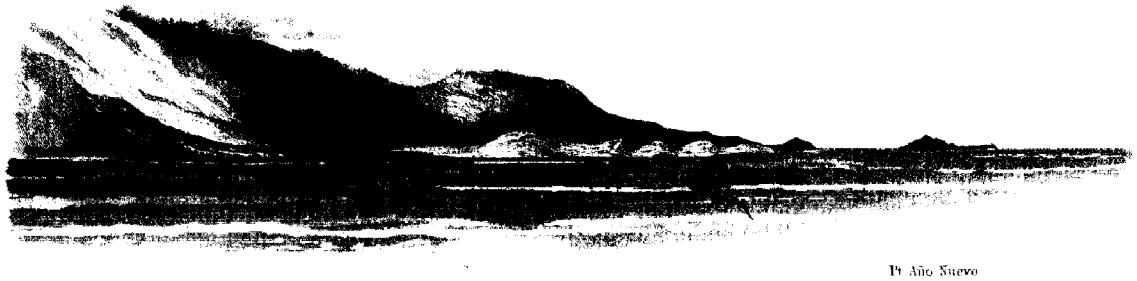
Landing on the beach is generally disagreeable, as it extends out some distance, but boats usually land at the embarcadero, at the foot of the bluff in the northwest part of the harbor.

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.



View Pt. Año Nuevo bearing S.E. by E. (Compass) 4½ miles

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, north 25° east, twelve and a half 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 10*h.* 18*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 foot 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.

POINT AÑO NUEVO.

From Point Santa Cruz to Point Año Nuevo the distance is eighteen miles, and the general direction west by north three-quarters north, at first curving to the southwestward of that course, and then to the northward, until within three miles of the rock off 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 ten to fifteen 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 thirty feet high. Upon this a light-house is to be built. The point itself is composed of rolling hills of shifting sand, varying from twenty to one hundred feet in height, while behind them rises

the Santa Cruz range of mountains. The coast trail, which follows 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.

The off-shore soundings from Monterey Bay to the Farallones show that the depth of one hundred fathoms gradually leaves the coast. South of Santa Cruz the depth of one hundred fathoms is found between eight and nine miles from the shore, and continues at this distance until nearly up with Point Año Nuevo, where it suddenly increases to fourteen miles distant and thence runs northwest on a line lying five miles outside of the Farallones. The deepest sounding was obtained only eight miles from shore and twelve miles southwest three-eighths west from Point Santa Cruz, and fifteen miles southeast by south one-eighth south from Point Año Nuevo. The depth was three hundred and thirty-five fathoms over a bottom of coarse black sand and mud, and only one mile outside the one-hundred-fathom line.

Black Mountain, in latitude 37° 19′, and longitude 122° 8′, attains an elevation of 2,809 feet, and lies twenty miles north by east half east from Point Año Nuevo.

A map of the anchorage was published by the Coast Survey in 1854.

Many of the coasting steamers report their compasses affected when close in with the coast between Point Santa Cruz and Point Año Nuevo. Although the vessel may be principally affected in this locality by undetermined ocean currents, influenced by the great submarine valley of Monterey Bay, yet, the report of Dr. J. B. Trask is that an extensive bed of magnetic iron occurs in this section, running down to the coast, where it crops out and exhibits a depth of several feet.

From Point Año Nuevo the coast has a general direction northwest for nine miles to Point Bolsa, along a very rocky and bold shore with fifteen fathoms at a distance of half a mile. This is the Cape Tonquin of Tebenkoff and others. At the distance of five miles from Año Nuevo is Pigeon Point, named from the wreck of the clipper ship ~~Wild~~ Pigeon.

Carrier

The high mountain lying square in from Point Bolsa is Black Mountain, distant thirteen and one-half miles, and bearing north 53° east. Two miles north of La Bolsa empties the Piscador, a small stream running through a valley of inconsiderable extent. For the foregoing twelve 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 northwest by north, and the distance twenty-four and a half miles. Three and a third miles above the Piscador opens the San Gregorio, another small stream, and two and

one-third miles still further opens the Tunitas. The seaboard between the valley of the Piscador and that of the San Gregorio undergoes 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 six hundred feet within a mile of it. The shore-line and the coast generally present a very broken and rugged appearance, occasioned by the deep gulches cut through to the ocean.

HALF-MOON BAY.

This anchorage is six miles south-southeast from Point San Pedro, and eighteen miles south by east from the Golden Gate. The southwestern point of the bay is formed by a bluff table-land about one hundred and sixty feet in height, called the Corral de Tierra, three hundred and twenty-five yards south of which stretch 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 southeast one-third east, seven-eighths of a mile, dropping suddenly from fourteen feet to five 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 three and a quarter to ten and one-quarter fathoms. These ledges lie parallel with the Coast mountains, and with the shore-line from which the outer one is distant one and three-eighths mile. From the eastern extremity of the point the shore runs northwest by north for a quarter of a mile; then northeast for three-quarters of a mile, curving to the eastward and southeastward in a long bend, for two and a half 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 one thousand and ninety-three 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 south 48° east, five miles from Pillar Point; thence to the mouth of the Tunitas the distance is four miles southeast. 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.

About two and a half miles along the coast, northwestward from Pillar Point, a dangerous ledge lies about one-half mile off shore. It has ten to fifteen feet upon it, and much broken water around it. Detailed examinations might develop less water. The shore behind it has a low bluff from twenty to sixty feet high,

with a broad, flat valley behind it, so that vessels, in hazy or dark weather, may mistake their distance from the shore.

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 southwest, distant half a mile, and anchor in four and a half fathoms, hard sand. With light southerly 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, one hundred yards wide, formed and protected by outlying rocks, and having three and a half 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 northwest by north one-quarter north, thirty miles from Point Año Nuevo, and south by east from Point Lobos, at the entrance to the Golden Gate. It is a black, bold, rocky promontory, over five hundred 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 sixty 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. Southeast from Point San Pedro the hills rise rapidly, and attain a height of one thousand nine hundred and eighty feet at Montara Mountain, three miles southeast by east from the point.

When Point San Pedro bears southeast, five miles distant, with the rocks off it hidden by thick weather, and the top of the ridge covered with fog, it may be readily known by a single pyramidal hill rising abruptly and breaking the general slope of the mountain towards the southwest. As the fog lifts, or the point is approached, the rock will be seen inside, or to the eastward of this hill; and the low bluff towards Half-moon Bay will show outside of it.

From Point San Pedro the bar outside the Golden Gate is distant twelve

Pt. Piedras (or San Pedro)

View Pt. Piedras bearing N. N. W. (Compass) 3 miles

miles, and from Point Año Nuevo it is forty miles upon a northwest by north 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 two hundred and eighty-six 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 its 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 one thousand feet, but a short distance back, and in seven miles rising to two thousand six hundred feet. On the south side, between the points, are stretches of low beach backed by rising ground; the hills are undulating and of moderate elevation, increasing very gradually in altitude to the southward, and reaching a height of one thousand three hundred and fifteen feet on the San Bruno Mountain, seven miles southeast of Point Lobos. The chart of San Francisco entrance, by the Coast Survey, shows the bold and characteristic topography of the vicinity of the Golden Gate, while the Coast Survey chart, showing the approaches and entrance to San Francisco, gives all that can be desired by the navigator.

Inside the bar a vessel may anchor anywhere, and the depth of water increases gradually to twenty-five fathoms on the line joining Points Boneta and

* The general coast chart, from Point Pinos to Bodega Head, gives all the characteristics of the topography and hydrography of the approaches and bay of San Francisco. It was published by the Coast Survey in 1862.

There are belonging to San Francisco four first-class pilot-boats, and fifteen licensed pilots. Two boats are always cruising outside, frequently as far as fifteen miles from the land in clear weather. During a fog they cruise nearer the bar, being, in that neighborhood, most likely to fall in with vessels.

Lobos. The Seal Rocks off Lobos bear southeast by south one-quarter south, distant two and one-eighth miles from Boneta, giving ample width between the heads. Inside this line the depth increases rapidly to sixty-nine fathoms in the narrowest part of the entrance, between Fort Point on the south and Lime Point on the north, where the width is one mile, and the bearing of the latter south by east three-quarters east from the former. Thence the bay opens well to the northeast, and the soundings gradually decrease. No hidden dangers have been discovered outside the line between Lime Point and Fort Point. Deep water exists around the Mile Rocks between Point Lobos and Fort Point.

Even without artificial safeguards and pilots, the Golden Gate would be one of the very safest entrances, as practically tested by the earlier navigators, and by the many thousand vessels that safely entered and left it in the earlier years of California's development. Yet we find that Beechey (vol. II, page 3) says: "The reef of rocks lies three-quarters of a mile from Point Boneta, while some scattered rocks, with deep water around them skirting the shore on our right, (upon entering,) marked that side also as dangerous, so that the entrance may be justly considered dangerous." It is difficult to properly characterize such an erroneous judgment. There is no reef off Point Boneta, but the deepest channel is close around it. The Mile Rocks are above water and have deep water around them.

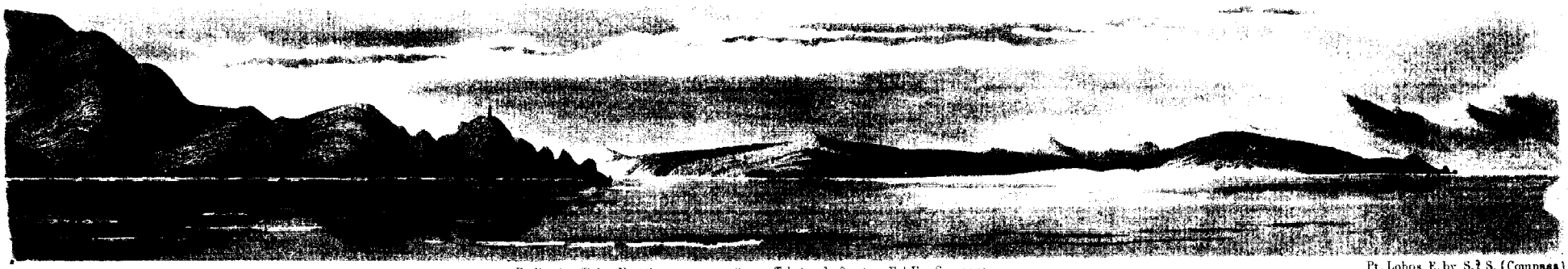
POINT BONETA.

The north head of the entrance to San Francisco Bay is formed by this point; a narrow, precipitous, rocky cape, nearly three hundred feet high, and stretching from the light-house about half a mile to the southeast. Behind it the mountains rise rapidly to an elevation of one thousand five hundred 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 car-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 three hundred 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.

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,

* "The reef of rocks lies three-quarters of a mile from Point Boneta."—Beechey, vol. II, p. 3. He may have mistaken the current rips for breakers.



Lt. Ho. Pt. Bonita E. by N. (Compass) Outer Telegraph Station E. ¼ E. (Compass) Pt. Lobos E. by S. ¾ S. (Compass)

Entrance to San Francisco Bay

and in clear weather it 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 three hundred and six 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 03.7 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 two and two-thirds miles, and the bearing east one-quarter north.

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 two hundred and seventy feet above the level of the sea. The bell weighs one thousand five hundred 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.

POINT LOBOS.

The south head of the entrance to San Francisco Bay is formed by this point, three hundred and seventy feet high, upon which Congress authorized the erection of a *secondary sea-coast light.* 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 con-

* This bell-boat has been removed.

spicuous 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 hill-tops, 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	50.5	north.
Longitude	122	29	39.5	west.
	h.	*m.*	*s.*	
Or, in time	8	9	58.6.	

This position is thirty-two feet north, and one thousand three hundred and seventeen feet west of the outer telegraph station.

FOG-TRUMPET ON POINT LOBOS.

For the benefit of their Panama steamers in thick and foggy weather, the Pacific Mail Company have erected, and maintain in operation, one of Daboll's fog-trumpets upon the pitch of Point Lobos. It is placed over a small house containing the machinery, cylinders, &c., and the mouth of the trumpet is about one hundred and fifty-two feet above mean tide. This is a trifle too high to see under the fog; the telegraph "lookout," about fifty-two feet lower, has that advantage.

Two out of each three blasts are divided to the northward and westward, and the other to the southward along the coast. In 1868, in a thick fog, with calm weather, we were enabled to ascertain the vessel's position outside the bar by the bearing of the sound and the depth of water.

On the 21st of July 1867, by special arrangements with the company, observations were made to determine the distance at which the trumpet could be heard. The weather was clear, and the wind blowing strong from the west-northwest. The last sound of the trumpet was heard just outside the bar at a distance of six miles, with Point Lobos telegraph bearing east half north. From experiments made upon the trumpet at the station the time from the beginning of one blast to that of the next was found to be thirty-five seconds, whilst the duration of the blast was from four and a half to five seconds. The blast is not uniform in strength; it starts shrill, falls, and ends shrill; but much of its uniformity depends upon the size of the steel vibrator and the pressure of the air in the cylinder.

The trumpet is located between the Cliff House and Point Lobos. It is seven hundred and seventeen yards north 19½° east from Arch Rock, and two and one-third miles south 39° east from Boneta light.

Off the western face of Point Lobos lie a number of black jagged rocks about fifty 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 southeast by south one-quarter

south, and is distant two and one-eighth miles. From it the general trend of the shore is in a line towards 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 is a long sand beach backed by small hillocks rising from the general surface and slope of the hills.

MILE ROCKS.

Two rocks are lying 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 fifteen feet above water, with a good depth 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. These rocks are one-third of a mile to the northwest half west of the small jutting point inside of Point Lobos, and very nearly two miles southwest half south from Fort Point. Vessels running in on the line of Fort Point and Alcatraz Island pass half a mile northward of the outer and larger rock. A good range to enter is to bring Alcatraz light-house to bear northeast by east half east, open well to the northward of Fort Point light-house and steer for it. This course will take you half a mile to the southward of Point Boneta and one-third of a mile to the northward of Fort Point, and will leave Mile Rocks one mile to the southward of you. The rocks bear almost southeast from Boneta light, and distant one and seven-eighths miles. They were called "One-mile Rocks" by Beechey in November 1826.

FORT POINT.

This is on the south side of the Golden Gate, bearing northeast by north one-quarter north, two and three-quarters miles from the Seal Rocks off Point Lobos, and from the south end of Point Boneta. It was formerly a bold, narrow, jutting promontory of hard serpentine rock, one hundred and seven 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 mounted with guns of the largest range and caliber. Upon the hill-side 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 on the northwest bastion of the fort, and rising about twenty feet above the parapet. The illuminating apparatus is of the fifth order of Fresnel, and shows a *fixed light of the natural*

Between the eastern extremity of the "four-fathom bank" and the shore, the distance is seven-eights of a mile; and within this space is to 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 eight-and-a-half-fathom channel, and small sailboats have passed in safety when they dared not try the bar. Vessels frequently use this channel when the heavy weather on the bar would prevent them from crossing it. Close in under the cliffs, two or three miles above Boneta, there is good anchorage in eight fathoms, with muddy bottom.

color fron sunset to sunrise. It is eighty-eight feet above the level of the sea, and, during ordinary states of the atmosphere, can be seen from an elevation of fifteen feet at a distance of fifteen miles. The angle of visibility seaward is bounded by the extremity of Point Boneta, bearing west three-quarters south, and Point Lobos, bearing southwest by south quarter south.

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

	° ′ ″
Latitude	37 48 31.0 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 December 15, 1863.

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

FOG-BELL AT FORT POINT.

The iron frame work supporting the bell is on the west face of the west bastion of the fort below the parapet. The machinery for tripping the hammer of the bell is on the south face of the same bastion. The base of the bell is forty and a half feet above the mean level of the sea. The bell weighs one thousand and ninety-two 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 on San Francisco Bar.—A bell-boat formerly lay outside the bar; but was removed some years ago. The English Admiralty Chart No. 2461, with corrections to March 1865, still retains the note.

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 of Point Lobos, stretching out gradually to six miles when abreast of it; 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 ten fathoms in half a mile, and deepens gradually inside. Not less than five fathoms exist over the bar when Point Boneta light bears between northeast by east half east, and north by west one-third west.

A vessel should not 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 sixty-one 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. It has, however, been ascertained, that these peculiarities of bottom exist also outside of the bar.

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.

The western and seaward end of the four-fathom bank is on the range of the south end of Point Boneta on Fort Point light.

Point Boneta light bears east by north one-eighth north, distant three and a half miles.

Outer telegraph station on Point Lobos bears east by south one-eighth south, distant five and a quarter miles.

The highest part of the western ridge of Table Mountain bears north by west one-eighth west.

There is a spot having but three and three-quarter fathoms upon it outside this buoy, bearing southwest by south, 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 northeast by east two-thirds east, distant one and a half miles from it. Between these points 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, four hundred and ninety-five feet high, distant one mile, and bearing northeast three-quarters east. 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 south by east three-quarters east. 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 two and a half miles, and bearing east by north. 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 José 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 upon 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 same substance 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 east three-quarters north. 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 four and a half feet of water can be obtained at the northwest part of the wharf at mean low water.

Telegraph Hill rises to a height of three hundred and one 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 six hundred yards long, in a west-northwest direction, by about two hundred and sixty in width, and rises to an elevation of one hundred and thirty-five 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." 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 have been built upon it. At the southeast side a small pier has been built to receive stores, ordnance, and materials. Off the northwest part, foul bottom makes out about three hundred or four hundred yards.

Alcatraz Island light-house is built on the summit of the island, and bears northwest from Telegraph Hill, distant one and two-thirds mile; from Fort Point northeast three-quarters east, distance two and five-sixths 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 one hundred and sixty-two feet above the level of the sea, and should be seen under ordinary states of the atmosphere at a distance of fourteen miles, or outside of 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	09	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 thirty feet above the water. The bell weighs one thousand and ninety-two pounds, and during foggy or thick weather is struck by machinery four blows at intervals of eight seconds, followed by a pause of twenty seconds.

Alcatraz is the Spanish name of the island; Beechey erroneously calls it Alcatrasses.

DANGERS.

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 three and a half fathoms upon it, lies one and one-eighth miles inside of Fort Point, and bears northeast by east quarter east 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 seven hundred 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 south half east, and we have ventured to distinguish the shoal by that name.

ANITA ROCK

shows above water at low tides, and is situated one and one-sixth miles inside of Fort Point, and bears east by north from it. It is only three hundred 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 quartermaster's bark Anita that struck upon it.

BIRD OR ARCH ROCK

is a small pyramidal rock, about forty-five feet in diameter, thirty feet high, and bearing west three-quarters south, 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 north-northeast from Bird Rock. From Alcatraz light it bears west by north, distant one mile. For about three hundred yards towards Alcatraz Island the bottom is foul and irregular, but outside that limit ten fathoms are found. The rock shows about four feet above the highest tides, being then not more than eight or ten 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, north by east one-quarter east, distant six hundred and seventy yards.

Bird Rock, east one-quarter south, distant three hundred and thirty yards.

Bird Rock, seen from the wreck, is on with the highest point of Yerba Buena Island.

BLOSSOM ROCK

is a ledge having five feet water upon it at the lowest tides, and within the three-fathom curve is about three hundred by two hundred 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 east by south from Alcatraz light, and one and one-eighth 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 north half west, distant one mile.

It was discovered and named by Beechey, 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 one and three-quarters mile from Telegraph Hill, and the bearing northeast by east. Its peak is three hundred and forty-three 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 northwest point a three-fathom bank extends one and one-quarter miles northwest by north, spreading to the eastward for half a mile, and thence running to the northeast 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, thirty feet long, showing fifteen 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, west by south, two and a quarter miles.

Telegraph Hill, southwest by south, one and seven-eighths miles.

West end of Yerba Buena Island, southeast by south, one-third south, three-quarters of a mile.

East end of Yerba Buena Island, east by south one-quarter south, 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 north-northeast, 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 seven hundred and seventy-one 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 northwest face by Raccoon Straits, three-quarters of a mile in width, having a depth of water ranging from ten to thirty fathoms, and a very strong current. A narrow high jutting point makes out from the southeast portion of the island, bearing north three-quarters west from Alcatraz Island light, and distant one and five-eighths miles. From this head the general trend of the southern face for over a mile is west by south toward Saucelito Point.

PUNTA DE LOS CAVALLOS

is a half a mile north-northwest 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 northwest by north for one and one-half miles 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 one and three-quarters miles, and the bearing northeast by east half east.

To Peninsula Point, forming the southwestern part of Raccoon Straits, the distance is one mile, and bearing northeast two-thirds east.

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

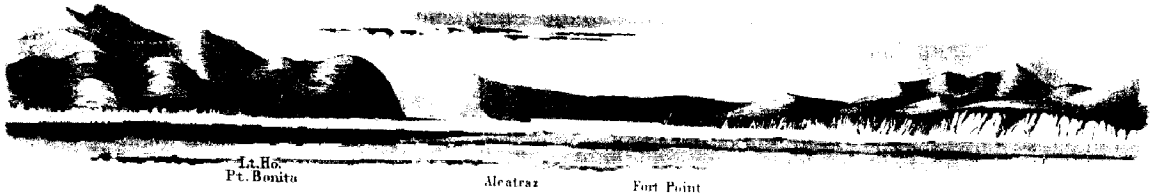
"*Outer telegraph station*," on the summit of the hill behind Point Lobos.

	° ′ ″
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. west.
	h. m. s.
Or, in time	8 09 45.0.

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



View of the Entrance to San Francisco Bay Alcatraz N E.½E. by Compass) 12 Miles

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 three hundred and one feet above the mean level of the bay 7″.4 north, and 9″.4 west of the astronomical station.

Rincon, summit of the slight hill northeast 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 land in the vicinity of San Francisco, it is of great importance that accurate determinations of their vessel's position should be often obtained by shipmasters, as fogs and thick weather are apt to prevail near the land.

Coming from the southward it is customary to make the coast about Point Año Nuevo, (latitude 37° 07′ north,) and then to follow it up to the bar, keeping about four or five miles from shore. If the weather be foggy or thick, vessels should keep closer to the shore, so as not to lose it, as there are no dangers between Point Año Nuevo and the bar. In good weather pass Point Año Nuevo on a northwest by north three-quarters north course at about eight miles distance, and continue this course until you are abreast of Point San Pedro, five miles off, when steer north one-quarter east for Point Boneta light-house until you are within five-eighths of a mile of the south end of Boneta, and have Alcatraz light-house bearing northeast by east half east of you open to the southward of Boneta. Now steer for Alcatraz light-house, passing nearly half a mile to the southward of Point Boneta, and one-third of a mile to the northward of Fort Point; and continue this course until the south end of Yerba Buena island bears east half north, and you are nearly one and three-quarters miles from Alcatraz. Now steer east half north for the south end of Yerba Buena, having the southern portion of the town of Oakland visible to the southward of it. This clears the Blossom Rock. On this course, when you are exactly between Alcatraz light-house and North Point, steer east-southeast along the line of wharves, and anchor off the northeast front of the city in ten fathoms soft mud.* But sailing vessels should be careful in using the course for Alcatraz

* [Extracts from the Regulations of the Harbor and Port of San Francisco.]

ARTICLE 1. No vessel shall be moored in the harbor of San Francisco nearer than five hundred yards from a line with the ends of the wharves; the harbor master will, on application, designate a proper berth, and give the necessary directions for mooring, according to the season of the year.

ART. 2. All masters and pilots are notified not to anchor vessels within five hundred yards of a

light, as otherwise they may be carried too close to the northern shore, where they are apt to be becalmed and baffled with variable airs and strong current eddies, and are sometimes carried ashore. Care must be taken on the other hand not to approach Fort Point too close, as the currents set around it irregularly and with great rapidity, and the bottom is uneven and rocky. Should the wind be so that the vessel cannot obtain the range of the light-houses without tacking, then she may cross the bar with Boneta light-house bearing from north by west to northeast by east; give Boneta a berth of a mile, and when within the heads, with Boneta abeam, gradually opening Alcatraz light-house north of Fort Point until abeam of the latter, when proceed as before.

Coming from the westward, first sight South Farallon light-house, (latitude 37° 42′ north,) which leave to the northward, and steer northeast by east seventeen miles, which will bring you close to the bar, and you will have Fort Point light exactly ahead of you. Now bring Alcatraz light to bear northeast by east half east, when it will appear about midway between Point Boneta light and Fort Point light. Cross the bar on this course for Alcatraz, and proceed as before directed. From South Farallon light-house, Point Boneta light-house bears northeast by east, distant twenty-three and two-thirds miles.

Coming from the northward and westward, first make Point Reyes, which is five hundred and ninety-seven feet high, and is in latitude 38° 00′ north, and longitude 123° 00′ west. Pass within two or three miles of it, but be careful not to get too close; for although there are fifteen fathoms within a quarter of a mile of the shore, vessels are apt to lose the wind by getting under the point. From Point Reyes steer east southeast twenty-two and a quarter miles, or until you open Alcatraz light-house to the southward of Point Boneta, when you must steer for Fort Point light-house about east by north three-quarters north, and cross the bar on that range. On this course when Point Boneta light-house bears northwest half north a little abaft the beam, Alcatraz light will bear northeast by east half east, when you must steer for it and proceed as before directed.

DIRECTIONS FOR VESSELS IN THICK WEATHER.

Strangers approaching the entrance during thick weather should do so with great caution, carefully taking frequent soundings with not less than two hundred fathoms of line; and as soon as soundings are had within this depth they should stand off and on until the weather clears, or a pilot can be had. The line of one hundred and fifty fathoms is distant four miles from North Farallon, nearly five miles from South Farallon, twenty-four miles from Point San Pedro, eighteen and a half miles from Pigeon Point, and seventeen miles from Point Año Nuevo. The neglect of this important precaution has caused the loss of several valuable vessels

---

line with the ends of the wharves from North Point to the Third Street wharf, which space must be kept clear for the accommodation of vessels approaching or leaving the wharves.

ART. 3. All vessels lying at single anchor must have a good and sufficient light shown in some part of the rigging, at least fifteen feet above deck, during the night. Any violation of this article will render them liable for damages in the event of collision.

and many lives. Steamers, in thick weather, are accustomed, if their captains be well acquainted with the entrance, to run close along the coast, and endeavor to make the land north of Point San Pedro, running in until they get about fifteen fathoms, and then lay a course for the bar, shoaling upon it to about five fathoms, and then gradually deepening, while the fog-gun gives them the direction of Boneta light-house. In this way shipmasters familiar with the entrance frequently run in during dense fogs; but strangers should never attempt it.

The United States 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 northwest 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 winds 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 southwest, weather thick, rainy, and squally; the wind not unfrequently ending at northwest, 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 those from the southeast are, almost invariably; the mercury falling one inch from its usual height of about thirty inches. When it begins to rise, the wind may be expected 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 twenty-six miles from the coast, we have had fresh breezes from the east-northeast, 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 three and a half 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 high water.

The corrected establishment, or mean interval between the moon's transit and the time of high water at Fort Point, San Francisco Bay, is 12*h*. 6*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 feet for the high waters, and 2.2 feet for the low waters. When the moon's declination is greatest, those differences are 1.5 feet 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 two tides of the same day are generally unequal in proportion to the moon's declination. The time and height can be obtained approximately from the following table:

Moon's declination.	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High water.		Low water.		High water.		Low water.	
	Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
	H. M.	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*
Greatest north	10 54	5.5	17 50	—0.5	12 50	4.1	17 09	2.6
Zero	11 44	4.7	17 25	0.8	11 44	4.7	17 25	0.8
Greatest south	12 50	4.1	17 09	2.6	10 54	5.5	17 50	—0.5

The interval is to be added to the time of the moon's meridian passage to give the time of high and low water. The time of the moon's upper meridian passage is given in the almanac, and the time of its lower meridian passage is the middle between two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest low waters; to which level the soundings on the chart are given.

Spring tides.—At the full and change of the moon the high waters will be 0.3 foot higher than the above, and the low waters 0.4 foot lower.

Neap tides.—At the moon's first and last quarters the high waters will be 0.3 foot lower, and the low waters will not fall as low by 0.4 foot.

THE SEASONS.

There are but two seasons on the Pacific coast, usually denominated the dry and the rainy seasons; the former corresponding to the Atlantic summer, and 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 rainy season since 1850 will show that the yearly amount is not great:

During the rainy 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	"	49.3	"	upon	83	days.
"	"	"	1862–'63	"	13.6	"	"	52	"
"	"	"	1863–'64	"	10.1	"	"	37	"
"	"	"	1864–'65	"	24.7	"	"	59	"
"	"	"	1865–'66	"	22.9	"	"	69	"
"	"	"	1866–'67	"	34.9	"	"	71	"
"	"	"	1867–'68	"	38.8	"	"	77	"
Average of eighteen rainy seasons....					2.63	inches.			

The rainy 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.

It is a curious fact that the gauge at the reservoir of the Spring Valley Water Company, at the head of Pillarcitos Creek, on the ridge between Half Moon Bay and San Francisco Bay, shows a rain-fall fifty per cent. greater than a similar gauge on Russian Hill, in San Francisco, two hundred and ninety feet above the sea.

The following table will show how the foregoing yearly amounts were distri buted each month, from November 1850, to the end of June 1868:

Mean monthly rain for			January,	inches, 5.27	Mean of winter, 14.31.
"	"	"	February,	" 3.57	
"	"	"	March,	" 3.18	
"	"	"	April,	" 1.84	Mean of spring. 5.75.
"	"	"	May,	" .73	
"	"	"	June,	" .03	
"	"	"	July,	" .01	Mean of summer, 0.06.
"	"	"	August,	" .02	
"	"	"	September,	" .04	

Mean monthly rain for October,	inches	.53	Mean of autumn, 3. 39.
" " " November,	"	2.82	
" " " December,	"	5.47	
Giving a yearly average of....		23.05	

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 yearly 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. In February 1864 no rain fell; and in February 1865, only 1.34 inches upon eight days.

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 four hundred 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 on the coast during the dry season have a thickness of one thousand three hundred to one thousand seven hundred 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 in part from the California State Register for* 1859.

	Sunrise.	Noon.	Mean of—		Sunrise.	Noon.	Mean of—
	Deg. Fahr.	*Deg. Fahr.*			*Deg. Fahr.*	*Deg. Fahr.*	
January	44. 2	57. 6	Winter, 50. 3	July	52. 6	67. 5	Summer, 59. 0
February	46. 8	60. 0		August	53. 6	67. 9	
March	47. 8	63. 0		September	53. 8	69. 8	
April	49. 6	65. 7	Spring, 54. 5	October	52. 7	68. 4	Aut'mn, 58. 3
May	50. 0	64. 5		November	49. 4	62. 0	
June	51. 8	68. 2		December	44. 9	55. 8	
				Average	49. 8	64. 2	Year, 55. 73

The lowest temperature experienced at San Francisco in the above seven years was 25° Fahr., 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 7° between the average of winter and summer. There is a range of 9° in the mean temperature of the months, and the mean of the whole year is about 55°.

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

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 day 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 southeast and east-southeast 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 traveling 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 Captain Fred. W. Beechey, in the Blossom, in November 1826, he carrying his work to the Strait of Karquines.

In October 1837, Captain 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 Beechey'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 twenty 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 one hundred and fifty miles. The head of steamboat navigation is at Red Bluffs, in latitude 40° 10′.

The Coast Survey charts furnish all that can be desired in regard to the lower part of the Bay of San Francisco and adjacent waters up to and including the mouths of the Sacramento and San Joaquin Rivers.

DUXBURY POINT AND REEF.

From Point Boneta to Duxbury Point, forming the west side of Bolanos* Bay, the course is west by north one-quarter north, and the distance nine and one-quarter miles. The point, sometimes called Bolanos, is a table-land about one hundred feet high, which stretches along the coast for a mile or more, and gradually rises to a narrow, nearly treeless ridge, one thousand three hundred and eighty-nine feet high at its greatest elevation, and running in a straight line twenty-five and one-quarter miles northwest quarter west 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 Bolanos Bay, as it does the Tomales Bay further 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 one and one-quarter miles southeast one-quarter south 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 east-northeast from it the distance is three miles, and from this line to the greatest bend of the bay the distance is one and three-quarters 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 found 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 one and one-quarter mile northeast by north.

In June 1860, the British bark 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

* Named after Volanos or Bolanos, one of the pilots of Vizcaino's expedition in 1602.

backed off and ran ashore again within a few hundred yards to the northward, and was totally lost in the breakers.

In 1867 the steamer Montana got on the rocks in a thick fog, but the rising tide relieved her.

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 one hundred 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.

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 one hundred feet high, and presenting a very noticeable feature from the sea. It sresemblance 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 two thousand feet, and the "Table Mountain" of Beechey attains an elevation of two thousand six hundred and four 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 Bolanos and Tomales Bays.

Table Mountain is a very sharp ridge, showing flat-topped only in two directions. From South Farallon light-house it bears northeast half north, distant twenty-four 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 west three-quarters north, and distance seventeen and one-third miles. To the east end the course is west by north, distance fourteen and two-thirds miles. From Duxbury the shore is bold and compact, running nearly northwest by west for about ten 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 north by east half east 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 southwest is broken by the reef.

The secondary astronomical station of the Coast Survey was on the north side of the first small gully, five-eighths of a mile from the eastern end of the head, and about forty 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 Drake's Estero, 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.

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 five hundred and ninety-seven feet in three hundred yards, and stretching nearly in a straight line east by north and west by south 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 northwest and southeast. 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. Fifteen miles west-southwest from the head a depth of sixty-one fathoms, grey sand with white and black specs, with deeper water (sixty-six fathoms) inside, and sixty fathoms, soft green mud, nine miles off the head. Thence it gradually decreases to thirty fathoms, fine green mud, about two and a half miles off the head. 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 twelve fathoms is found quite near to the rocks.

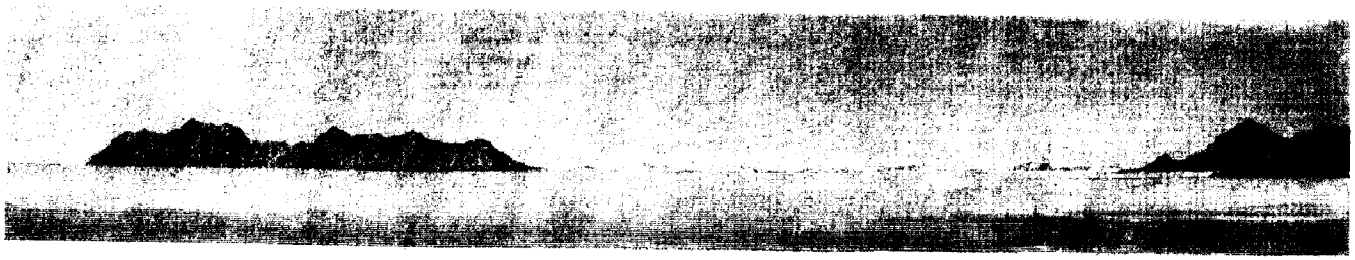
Vessels bound to San Francisco from the northward always make Point Reyes, and, when up to it, sight two mountains on the southern peninsula of San Francisco as islands. One of these is Blue Mountain, one thousand one hundred feet high, and the other, Abbey Hill, one thousand two hundred and fifty feet.

In 1859, an officer of the Coast Survey, while occupying the station on Point Reyes Hill, one thousand three hundred and eighty-nine feet high, and eight and three-fifths miles northeast half north from Point Reyes Head, observed, during a perfect calm, a bark 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 magnetic variation computed for July 1860, was 15° 58′ east, with a present yearly increase of 1′.

There is no light-house upon Point Reyes.

The British Admiralty Chart of the Pacific Coast No. 2461, with corrections to



N.W. (Compass)

Pt. Reyes, distant 20 miles

March 1865, has a light on Point Reyes, marked Lt. Fl. (flashing light.) The Russian corvette Novick was wrecked two miles north of Point Reyes some years since, having been misled by an English chart with a light marked on this head.

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 dispatched 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 but little doubt that he also saw the Farallones.

The present name was given by Vizcaino, 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 twenty-three and a half miles; the whole group is disposed in a nearly straight line running northwest from the southern one. This is the largest and highest, extending nearly a mile east and west, attaining an elevation of about three hundred and forty 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 dike 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 fifty fathoms is obtained at a distance of three miles, shoaling to twenty fathoms in two miles; whereas, inside of it, the bottom is very regular at thirty fathoms for ten miles, and then decreases regularly to the bar. On the southeast side of the island there is said to be good holding-ground in fifteen fathoms.

A rock is reported to exist about halfway between the South and Middle Farallon, a break having been seen about that position by pilots and by the lighthouse keeper. It is supposed to be a bayonet rock with about four fathoms upon it.

The San Francisco pilot-boats cruise off the island.

An extended and detailed examination around the island has been published upon the general coast chart published by the Coast Survey.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is 10*h.* 37*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 twenty-three lives were lost.

SOUTH FARALLON LIGHT.

The tower stands on the highest peak of the island. It is built of brick, seventeen 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 ten seconds every minute* throughout the horizon. The time of the flash varies on different nights. In 1859 we found the average time thirteen seconds. It is about three hundred and sixty 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 feet at a distance of 26.9 miles.
30 feet at a distance of 28.1 miles.
60 feet at a distance of 30.7 miles.

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 three thousand four hundred and seventy-one 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, northwest by west three-quarters west, six and three-fifths miles.

Western head of Los Reyes, north by west two-thirds west, seventeen and three-quarters miles.

Point Boneta light-house, northeast by east, twenty-three and a half miles.
Point San Pedro, east, twenty-three and a half 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 two hundred and seventy-five 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.

This is a single rock, between fifty and sixty yards in diameter, and rising twenty or thirty feet above the water. It lies northwest by west, distant two and a quarter 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.

These 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 one hundred and sixty-six feet, whilst the southern one of the group is a mere rock of about thirty-five yards in diameter, and hardly twenty 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 extents of the islets 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 north 64° west, distant six and three-fifths miles from the light-house on the South Farallon. From the light-house site of Punta de los Reyes it bears south, distant fourteen miles.

The Noonday Rock, with three and a half fathoms of water upon it, lies west by north, distant three miles from the North Farallones, with intervening rocky bottom in thirty-five fathoms. Between them and Los Reyes the depth increases to fifty 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. He calls them the islands of St. James.

About 1775 they received their present name, after the voyages of Bodega and Manulle, under the orders of Bailio Frayle Don Antonio Bucarolli y Visera. 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 Farrallones. It is of very limited extent, and is, doubtless, a sharp isolated point of a small ledge, having from twenty to thirty fathoms immediately around it. It is plainly visible when directly over it, and has three and a half fathoms of water upon it at mean low water; but at the extreme low water of spring tides there will be hardly more than three 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, north by east one-quarter east, distant 13.8 miles.

North Farallon, east by south, distant 3.1 miles.

South Farallon light-house, east by south three-quarters south, distant 9.7 miles.

Point Boneta light-house, east by north five-eighths north, distant 30.3 miles.

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

The geographical position of this rock is—

	° ′
Latitude	37 47.2 north.
Longitude	123 08.7 west.

Sometimes in clear weather, off Point Reyes Head, a high white cone appears

View from Noonday Rock. North Farallones bearing E. by S. distant 3 miles.

View from Noonday Rock. Pt. Reyes bearing N. by E. ¼ E. distant 14 miles.

in the back ground. This is Mount Helena, which bears north by east fifty-eight and a half miles distant, and is four thousand three hundred and forty-three feet high. It is, however, too distant to be visible, except in clear weather.

In the description of the South Farallon, and in the directions for approaching San Francisco, we have heretofore advised vessels approching 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 north-northeast 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 southeast, distant two and a third miles. Coming from the northwestward at night, vessels should not bring the South Farallon light to bear anything east of southeast by east, 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 one-hundred-fathom curve is only four miles distant, and the fifty-fathom curve only two miles, with very irregular bottom.

The existence of this ledge was first made known by Assistant George Davidson, of the Coast Survey, in April 1860, it having been discovered by Captain George Simpton on the 13th of March. The weather was calm, and the pilot-boat, drifting with the current, was fishing off the North Farallones in forty 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 east by south at an estimated distance of five miles; the single shore range taken was unavailable for plotting.

On the 2d of January 1863, the clipper ship Noonday, drawing twenty-one feet of water, struck twice upon the isolated rock forming the apex of the ledge; passed over it, and within an hour sunk in forty 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 nine or ten 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 east by south half south.

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

VISTULA SHOAL, OFF SAN FRANCISCO ENTRANCE.

In January 1863, Captain Bearsly, of the ship Vistula, reported that he had discovered a shoal about eighty miles south-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	36	42	north.
Longitude	124	10	west.

FALMOUTH 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 definite concerning it, was published in the last edition of the Coast Pilot to call attention and invite further examination. In the admiralty chart, corrected to 1865, the Reed Rocks are marked "doubtful" in latitude 37° 29′, longitude 137° 24′. The United States ship Falmouth discovered a rock with from three to five fathoms of water upon it, in latitude 37° 22′, longitude 137° 25′. The latest information is from Captain Redfield of the whaling brig Susan Abigail. He reports dangerous rocks nearly awash about six hundred and sixty miles nearly west by south three-eighths south from the South Farallon light. Their position, as determined by observation under favorable circumstances, is in latitude 37° 35′, and longitude 137° 30′. The larger rock he judged to be about fifty feet broad and one hundred and fifty feet long, and to have about ten feet of water upon it. South-southeast from this rock, at the distance of a quarter of a mile, he saw a discoloration of the water, making it probable that another and smaller rock existed in that vicinity.

It is evident that a dangerous reef exists in this locality, and that all the observations refer to it.

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 north one-third east direction about ten miles; then curving to the northwest, and changing to a high precipitous coast running to Point Tomales, which bears north by west fifteen miles from Los Reyes. Three-quarters of a mile before reaching the point a rocky islet eighty feet in height is seen close in shore. Seven and a half miles above Point Reyes is the opening to Abbot's Lagoon or 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 northeastward. The ridge forming Tomales Point and the western shore of Tomales Bay is the northern extremity of that starting from Duxbury Point. About four and a quarter miles from the point the ridge is six hundred and seventy-three 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. Thirteen miles broad off the beach, between Points Reyes and Tomales, the depth of water is sixty fathoms, soft green mud, gradually decreasing to thirty fathoms, same bottom two miles off shore. Fourteen miles west-southwest of Tomales Point the depth is seventy fathoms, fine green sand and mud, with thirty fathoms green mud two miles off the point.

The Bay of Tomales extends from Tomales Point southeast three-quarters east for twelve and a half miles, with an average width of seven-eighths of a mile. The entrance is narrow, and obstructed by a bar having a depth of ten feet, between sandy lumps of seven feet. The bar lies nearly half a mile east of the extreme point, and four hundred 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, while we were on Tomales Point, the waters of the bay changed to a deep brownish 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 north-northwest eighteen 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 one and three-quarters of a mile northwest,

where it changes to a broad sand-beach, with low country near, but high hills in the background. 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. Thirteen miles west-southwest from the head the depth of water is seventy-one fathoms, over fine green sand, decreasing regularly to thirty fathoms, over soft green mud, from two to one and a half miles off the head, and ten fathoms half a mile from shore. The highest part of the head is about two hundred and sixty-five 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.
	h. m. s.	
Or, in time	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 Rumiantsoff, and placed it in latitude 38° 17′.8, longitude 122° 59′.0.

BODEGA BAY.

From Tomales Point to Bodega Head the course is northwest three-quarters west, and the distance four and three-quarters miles. The average width of the bay to the eastward of the above line is one and two-thirds miles, with the shore running nearly a parallel course. The shore of the bay is bordered by numerous rocks, is abrupt, and reaches a height of five hundred and ninety-four 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 east by north five-eighths north, two and a half miles from the head. One mile west of the estero, a low, narrow sand-spit one and a half miles long, and covered with bushes, stretches toward 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. A depth of eighteen feet can be carried into this lagoon over the bar at low water. The channel increases in depth for one mile inside, and runs close under the western shore. The depth of water on the bar is subject to changes after heavy southeast weather.

One-quarter of a mile east-southeast from the middle of the southeast face of the head lies Bodega Rock, (Omonia-pa-i Island of the Russians,) rising a few feet

above high water. From this rock a reef extends five-eighths of a mile east-southeast from the head, with nine feet upon it, and suddenly dropping off to three or five fathoms. The reef is densely covered with kelp, and the breakers usually indicate its position. Between the islet and the head there is a narrow four-and-a-half-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. When directly between the head and rock keep closer to the head than to the rock. If coming in to the southward of the reef, be careful not to bring the well-marked mouth of the Estero Americano (designated Estero de San Antonio on the Coast Survey chart) anything to the eastward of northeast by east half east, and run that course until the eastern bluff of the head bears northwest by west one-quarter west; this will clear the tail of the reef about one-eighth of a mile in six fathoms; then haul up northwest by north half north for the anchorage, about three-quarters of a mile distant.

The best anchorage is in about five fathoms of water, with the southeast face of the head bearing southwest three-quarters west, the point of the lagoon-spit bearing west one-quarter south, and the northern point of the rock bearing southwest one-quarter west. In this position the nearest part of the head and the nearest part of the rocks are half a mile distant, and the bottom is hard and composed of coarse sand and small patches of clay. This anchorage 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. 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 five hundred or six hundred 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 ten feet, then bend almost at right angles, without a branch for ten or fifteen 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 11*h.* 15*m.*, and the difference between the greatest and least intervals is 1*h.* 48*m.* The mean rise and fall of tides is 3.7 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.* 07*m.*

To find the times of high and low waters, first compute them for San Francisco, and from the numbers thus obtained subtract forty-nine 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 1817 Kotzebue always refers to it as Port Rumiantsoff, and clearly indicates that the Russians intended to obtain possession of this country.

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. The Russian work of Tebenkoff (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 northwest and southeast 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 northwest three-quarters north from Los Reyes, distance thirty-two miles, and fifteen miles from Bodega Head. The large white buildings of the Russians on the rising ground, and about one hundred 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 near approach dangerous.

A little trade is now carried on here.

The approximate geographical 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 thirty 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 one and a half miles from the southern point of the head, and extend two and a half miles to the mouth of a small stream called Salmon Creek; these dunes are bordered by a broad sand beach, and closely backed by the Coast range. Nine and a half miles from the head the Slavianka of the Russians empties into the sea, breaking through the coast hills that here reach an elevation of two thousand two hundred 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. Six and a half miles west by south half south from its mouth, the chart of Tebenkoff has seventy fathoms over muddy bottom, with thirty-five fathoms sandy bottom about two and a half miles off shore. During the summer the bed is dry above Healdsburg, thirty 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, two thousand one hundred and ninety-eight 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 forty trees were cut down that measured from five and a half feet in diameter (spruce) to eight and a half feet (redwood.)

Between Fort Ross and Point Arena are a number of small coves upon whose shores saw-mills have been erected, giving a large summer trade to numerous small coasters. These anchorages are Timber Cove, Stillwater, Salt Point, Fisk's Mill, Stewart's Point, Walalla River, Bowen's Landing, Havens Anchorage, and Arena Cove.

Here is the Northwest Cape of the Russians, and placed by them in latitude 38° 35½′.

From Fort Ross to Punta de Arena the coast is almost straight, running northwest by west one-quarter west for thirty-seven 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 two thousand feet high, and wooded to their summits.

HAVENS ANCHORAGE.

About twenty-four 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 gully, 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, and is the first stream that breaks through the Coast range north of Ross. It is called Dirado River by the Russians, but is placed six miles too far south. 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 two thousand one hundred and ninety-two 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 northwest one-quarter west, distant sixty-seven 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

N. by W. (Compass) Pt. Arena, distant 6 miles

averages about two hundred 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 per hour, 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, and two reefs of rocks, upon which the sea is constantly breaking, mark the north and south sides of the passage thereto. Vessels generally moor with their sterns in shore.

The south point of this cove or anchorage is a bright bluff twice as high as the bluff towards Point Arena, and is distinctly visible fifteen miles to seaward in the afternoon when the sun is shining upon it. By it the position of Point Arena may be determined, when the latter is below the horizon.

About a mile and a half north by west from the point are several rocks showing just above the 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 Point 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.

For thirty miles northward of Point Arena are a number of small anchorages, where vessels load lumber for San Francisco. The order in which they are passed is Novarro River, Cuffee's Cove, Albion River, Little River, Mendocino Bay, Rus-

sian Gulch, Caspar Creek, and Noyo River. In 1868 the amount of lumber shipped from these places was 54,000,000 feet.

Ten miles northward of Point Arena is the small stream named Novarro River. Articles floating from this stream are always found on the shores to the northward, showing the existence of an eddy current close in shore.

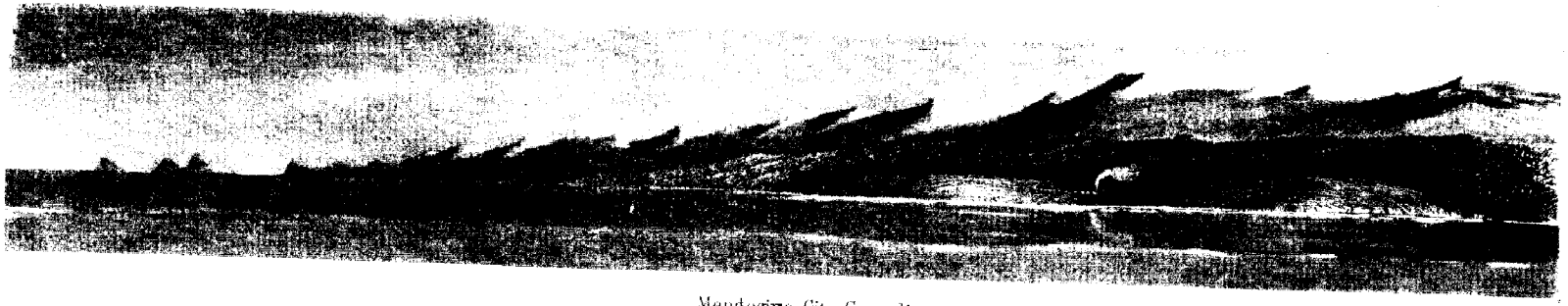
ALBION RIVER.

From Point Arena the first point to the northwestward is twenty-four miles distant, and bearing northwest by north two-thirds north. After passing Arena, the coast trends to the eastward of north, and for six miles presents a low shoreline with sand beach, changing suddenly to a straight, high bluff shore with a few trees, and backed within half a mile by hills of two thousand 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 Survey 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 center.

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 sixty 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 one hundred yards just off the south end of the point in six fathoms, run on about one hundred and fifty yards past the point, head up handsomely, and anchor in five or six fathoms, hard bottom. It is a bad berth in summer, and in winter a vessel



Mendocino City Cove distant 8 miles N.N.W. (Compass)

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 sometimes called Meiggsville, but generally it is known as Mendocino.

The secondary astronomical station of the Coast Survey is on the north head, and its geographical posititition—

	° ′ ″	
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″ east, July 1857; increasing about 1′ yearly.

From the point just north of Mendocino Bay, (the first one made from Arena,) the shore runs nearly straight for twenty-eight miles north by west half west, being low and bounded by rocks for twelve miles, when the back hills reach the water and present an almost vertical front two thousand feet in height.

From the deepest part of the bight the general trend of the coast to Cape Mendocino is northwest three-quarters west, and distant forty-five miles, and for part of this distance it is particularly bold and forbidding, the range of hills running parallel to the shore and rising directly from it. At a distance of one mile from shore the general depth of water is twenty fathoms. About twenty-six miles north of Mendocino Bay and twenty miles south of Shelter Cove is an indentation in the coast line, locally known as Summer Harbor, whence a limited shipment of agricultural produce is made in summer.

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 125th degree 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 from sixty to three hundred feet in height, makes square out just above latitude 40° north 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 northwest by north, one-third north, distant sixty-five 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 five 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 sixty 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° 22′ east, in July 1857; increasing about 1′ yearly.

Upon old Spanish charts a point in this vicinity is designated Point Delgado, perhaps referring to it. La Pérouse, 1787, calls it Punta del Gada.

Tebenkoff's chart designates it as Point Vizcaino, but locates it in latitude 39° 48′, longitude 123° 53′.

A hydrographic sketch of Shelter Cove accompanied the Coast Survey report for 1854.

About six miles northwestward of Shelter Cove, under a jutting point, a small stream enters, called Marone River on the Russinn chart of Tebenkoff. Thence to Punta Gorda the coast is bordered by a good sand beach, while the hills, rising behind it, are rounding, covered with grass and herbage and sparsely timbered. This characteristic of the hills exists from Shelter Cove to Cape Mendocino, and the valleys are dotted with settlers' houses, &c. The tops of the mountains are covered with chapparal. One noticeable peak, about three miles inland and rising above the Coast range, just north of Shelter Cove, attains an elevation of four thousand eight hundred and eighteen feet, and another prominent peak lies seven and a half miles southeast of the former.

In 1867 the light-house steamer Shubrick was wrecked about six miles northward of Shelter Cove.

PUNTA GORDA.

This headland is seventeen miles northwest by west one-half west from Shelter Cove, and, as its name implies, is a large, bold, rounding point. Half a mile from it lies a large rocky islet, with rocks close in shore, north of the point. From Point Arena it bears northwest three-quarters north, distant eighty-one miles, and the line passing tangent to Punta Gorda runs one mile outside of Cape Mendocino.

Cape Fortunas is called Punta Gorda by La Pérouse.

Tebenkoff designates Punta Gorda as Point Delgado.

CAPE MENDOCINO.

This mountainous headland, forming the western limit of the northwest trend of the coast hence from Point Reyes, is ninety-three miles northwest three-quarters north from Punta de Arena, and from the cape to the Straight of Fuca the general trend of the coast is north-northwest.

Here the range of bold coast hills from the southward appears to meet a range from the eastward, forming ridges of fourteen hundred feet elevation within a mile of the coast, with peaks of twenty-five hundred to three thousand feet within ten miles of the sea.

The face of the cape is steep and rocky near the water-line; above that the general appearance is rolling and grass-covered, except in the deep valleys and upon some of the steep hill-sides.

The well marked and regularly-shaped pyramidal rock immediately off the pitch of the cape, and known as the Sugar-loaf or Haystack, is a readily distinguished feature in approaching it from the north or south, and from seaward. It is three hundred and twenty-eight feet above the sea, and bears west 18° south one-third of a mile from the light.

The large rocky islet off the face of Cape Fortunas is not so regularly shaped.

Cape Mendocino is noted for having a small dangerous ledge, bare at all tides, lying three miles broad off it, and known as Blunt's Reef. The larger breaker of this reef bears west 10° south from the light, and distant three miles; the smaller breaker is a short distance to the northeastward of the former. This reef was noticed by Vancouver as being about one league off shore. (Vol. I, p. 198.)

The passage between the reef and the cape has been generally used by the coasting steamers and lumber vessels, but a recent preliminary examination shows it to be a dangerous locality that should be avoided. At low tides, with a large swell from the westward, and smooth surface, several heavy breakers are occasionally seen.

A great break bears west 21½° south from the light, and apparently the same distance therefrom as Blunt's Reef. This does not break at half-tide and very seldom at low-water, but it is very heavy when it does occur.

Between that great break and Blunt's Reef, but probably three-quarters of a mile nearer the cape, are three breaks, bearing respectively west 15¼° south, west 16½° south, and west 18¾° south from the light. They do not occur frequently.

Nearer the cape than to Blunt's Reef are three sunken rocks, showing breaks at low water, and one rock awash at half tide. From the light-keeper's dwelling the northernmost one bears west 19¾° south, distant three-quarters of a mile from the Haystack; the second bears south 30° west from the dwelling, and is about three-quarters of a mile from the Haystack; the third bears south 8⅓° west from the dwelling, and is about one mile from the Haystack. The fourth, awash at half-tide, is on the same bearing as the last, but nearer the Haystack.

There may be a clear passage of one mile in width between these dangers, and

there may be sufficient water upon some of them for ordinary vessels and steamers to pass over them, but until the present survey settles the doubt it will be prudent to avoid this passage.

Steamers have passed dangerously near some of these sunken rocks, and, in 1857, one was distinctly seen almost under the wheel of the steamship Commodore.

In January 1860, the steamship Northerner struck upon one of these rocks. The weather was slightly hazy; long, large ground-swell from the northwest; little wind and low tide. She was bound up the coast, and going over ten 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 near the northern side of Cape Fortunas, where shoal water extends out for a quarter of a mile, and went to pieces in a heavy southwest blow that sprang up.

CAPE MENDOCINO LIGHT.

The tower stands on the outermost part and about one-third of the height of the cape above the sea. It is a frustum of a pyramid of sixteen sides, twenty feet high from base to focal plane, constructed of iron, painted white and surmounted by a lantern and illuminating apparatus of the first order of the system of Fresnel. The dome of the lantern is painted red. The light is a *revolving white light, showing a flash every half minute.* The duration of the flash is five seconds, of the partial obscuration five seeonds, of the total eclipse fifteen seconds, and of the second partial obscuration five seconds.

The focal plane of the light is four hundred and twenty-six feet above the mean level of the sea, and should be visible, in a favorable state of the weather, from a height of—

10 feet at a distance of 27.2 miles.
20 feet at a distance of 28.7 miles.
30 feet at a distance of 30.0 miles.
60 feet at a distance of 32.5 miles.

The geographical position of the light, as determined by the United States Coast Survey, is—

	°	′	″	
Latitude	40	26	17	north.
Longitude	124	24	10	west.
	h.	*m.*	*s.*	
Or, in time	8	17	36.7.	

And the computed magnetic variation for January 1870, is 17° 21′ east.

The light has an arc of visibility from north 7° west to south 23° east, and can be seen off Humboldt Bar.

The light-house keeper's dwelling is a two story brick building, with a wing of one story on each side. Its color is brick-red, with green blinds to the windows, and

View of Cape Mendocino N. (by compass) 12 Miles.

is situated two hundred and ten yards southeast by east from the light, and four hundred and sixty feet above the sea. The light and dwelling are both projected against the face of the cape from most positions seaward.

From Cape Mendocino the following bearings and distances are given:

To Point Arena, southeast three-quarters south	93	miles.
To Trinidad Head, north	39	miles.
To Redding's Rock, north three-quarters west	56	miles.
To Crescent City light, north by west	79½	miles.
To Cape Orford, north by west seven-eighths west	145	miles.

CAPE MENDOCINO.

The extent of shore-line from Point Boneta to Cape Mendocino is about two hundred and twenty-four 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 eight hundred miles (the distance from latitude 44° to Santa Cruz) in four days.

La Pérouse did not see the cape, but places it in 40° 07′. Between 40° 38′ and 36° 58′ he appears to have been carried thirty miles to the southward by the current, and a little off shore. This off-shore set of the current has since been often experienced.

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.

This head 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, now well settled. 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 regular survey of these heads and the dangers surrounding them is in progress. 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. Tebenkoff's chart has forty-nine fathoms over sandy bottom, nearly three miles. outside of any rocks laid down off the cape.

After passing it the shore changes to a straight, low, sandy head, with valleys running some distance inland.

We have named this headland Cape Fortunas, to avoid the repetition of Mendocino, and to commemorate Ferrelo's discoveries.

La Pérouse calls this cape Punta Gorda.

Eel River is a small stream with a bar at its mouth, and distant fourteen miles from Cape Mendocino. It is very contracted and crooked, receiving the waters of a great many slues 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. A greater depth of water is claimed on the bar, six and a half feet having been found at low water; and several cargoes of produce have been carried out. The Indian name for the river is Weé-ot. It rises by two heads in about latitude 39° 30′, about thirty 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 twenty-one miles from Sugar Loaf Islet, off Cape Mendocino, and the bar north by east twenty-one miles from Blunt's Rocks. The bar is one and a quarter 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 northwest, 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 two hundred and fifty 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 eleven fathoms, suddenly shoaling to four fathoms inside. Vessels kept the north spit within one hundred and fifty to two hundred and fifty 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

View of Red Bluff Entrance Humboldt Bay S.E.¼ E. (Compass) 2¼ miles.

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 it was over half a mile in extent, with only sixteen feet of water at high tide. A bare spot then showed at the lowest tides west-northwest of the end of the south spit. In that year a strange brig thumped over the north sands while on the course prescribed by the sailing directions of 1851. In 1857 less than thirteen feet at high tide could be found upon it, and its extent was very much increased. Eventually a deep and narrow channel was cut through. In April 1869, the bar had sufficient water for the largest lumber-laden vessels, but within the previous two months had moved a mile and a half to the northward of its winter position, and in the same time the north point of the entrance had formed nearly half a mile to the southward. 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, a brig deeply laden with spars lay in the bay 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 thirty-one days. In March 1854, the Coast Survey party laid fourteen 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 one and three-eighths mile from the highest part of Red Bluff, which bore east by south half south. It then had a depth of three and three-quarters fathoms, and a width of six hundred 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 an assistant who was there with us 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." A large can buoy is anchored (1869) in sixteen fathoms of water, west three-quarters north from the bar, west half north from the light-house, and northwest by west three-quarters west from Red Bluff. It has a very heavy anchor and mooring-chain, and vessels frequently hold on by it in thick, unfavorable weather. Vessels coming up the coast in sixteen fathoms, in moderately thick, dark weather, can hardly fail to find this mark.

The best advice we can offer in regard to entering the bay is to *wait for the tug.*

From experiments made in 1854 we found the ebb current to run three miles per hour, with a maximum velocity of four and five miles between the points of entrance. In 1867 we found the ebb current running to the west-northwest from the bar, setting the vessel well off shore.

In 1861 the steamship Columbia was detained in the bay six days by unusually heavy weather; at the same time a lumber-laden bark was unable to cross the bar for twenty-five days. The first reported case of any vessel being struck by lightning on this coast happened at Humboldt, February 25, 1861.

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 stories, with a tower rising twenty-one feet above the centre of the roof; 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 fifty-three 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 13½ miles.

30 feet at a distance of 14½ 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 one hundred 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.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is 12*h.* 2*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 forty minutes for Humboldt Bay.

The bay is situated immediately behind the low sand spits and dunes, and extends nine miles north and four 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 three and a half 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 six and a half 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 three and a half fathoms is found within one hundred and fifty 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 one hundred feet high, and immediately behind the town. On the same side, and four miles north of the entrance is the town of Eureka, off which is a portion of the channel, having nearly three fathoms in it, but no channel reaching it having more than one and a half fathoms. 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 slues and ponds. The largest, called Indian Island, is about a mile long (northeast) 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 two hundred 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 towards the entrance a perpendicular face, composed of sand and gravel colored by the decomposition of iron ore near its surface, which is ninety-six 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 primeval elephant. 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.

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 Tebenkoff's description of the charts in his atlas published in 1848, with accompanying chart containing soundings and details of Indian Island, &c., settles that question:

"About eight and a half miles from the port of Trinidad is situated the entrance to the Bay of Indians, called entrance of Rezanoff. 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 Winschep, a sea-otter 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, (twelve feet,) and then it breaks on the bar."

He placed the south point of the entrance in latitude 40° 55′.4, longitude 124° 08′.0.

It was named Rezanoff after the Russian ambassador to Japan in 1804, and who had influenced the Emperor Paul not to break up the Russian-American Company.

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 the northwestern part of Humboldt Bay. It averages about one hundred yards in width, with a bar at its entrance that prevents egress; but the vast amount of timber in

View of Trinidad Head and City

the valley has found a passage by a small canal to the northwest point of Humboldt Bay. A deep slue from 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 north half west seventeen and a half miles from the bar of Humboldt Bay, and north thirty-nine miles from Cape Mendocino. The low sand beach off Humboldt continues past Mad River to within a couple of miles of Trinidad Bay, when it changes to a bluff, guarded by innumerable rocks. For the entire distance of the low beach a depth of from ten to fifteen 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 three hundred and seventy-five 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 milé, 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 three hundred 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 one hundred 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 west by north, 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 bark Arcadia was totally lost in a southeast gale, her ground tackle being insufficient to hold her.

A chart of Trinidad Bay is published by the Coast Survey.

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 connection with San Francisco by steamers is now regular. 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 of which we measured was about twenty feet in diameter, and a dozen trees standing in the vicinity averaged over ten feet. One is affirmed to be standing on the bank of a small stream at the southeast part of the bay, that measures over ninety 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 fifty or one hundred feet, and frequently attain two hundred and fifty feet in height.

"Port Trinidad" was discovered June 10, 1775, by Heceta and Bodega, and placed in latitude 41° 07′ north. 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′ north.—(Vol. I, page 200.)

The Indian name of the bay is Shó-ran.

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 shore running northwest by north 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." Tebenkoff gives sixty-five fathoms three and a half miles broad off this broken shore.

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 southwest, 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 great-

est indentation at the north end of the once famous Gold Bluff, in latitude 41° 27′ north, and longitude 124° 03′ west, and then trending westward to Crescent City. Gold Bluff has an extent of ten miles, and is very bold and high.

Between Rocky Point and Gihon 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 Rock.—When abreast of Rocky Point, about latitude 41° 08′, Redding Rock is visible from a vessel's deck, and with the morning sun shining upon it presents the appearance of a whitish cone of equal sides and base. When seen from the west-southwest (compass) the northern face is nearly perpendicular and the southern face slopes about one in two, with a whitish surface and dark base. Its elevation is eighty-three feet and it lies five miles broad off Gold Bluff, in latitude 41° 21′, and longitude 124° 10′. It is a single, large, rocky islet about two hundred 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 a short distance towards it. Tebenkoff calls it Bird Rock; it received its present name in 1849 or 1850.

KLAMATH RIVER.

Two miles off shore from Rocky Point to the mouth of the Klamath River the depth of water varies from eighteen to ten fathoms. Between Redding Rock and the Klamath Tebenkoff gives thirty-five and thirty fathoms about three miles off shore.

The mouth of this river is in latitude 41° 33′ north, longitude 124° 05′ west. It is, perhaps, two hundred 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 two and a half 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 seventeen 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 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, southwest three-quarters west, and a little more than half a mile distant from the light-house. A depth of ten 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 three and a quarter fathoms, hard bottom. To reach this position run for the small, round rock bearing southeast seven-eighths east, seven-eighths of a mile from the light-house; pass it on the east side, giving it a berth of one hundred yards; steer north by west one-quarter west for three-eighths of a mile, passing one hundred 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 two hundred yards to the eastward. Head up for the town and anchor in three and a quarter 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 weather, 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 formerly carried as many passengers and as much freight for this place as they did to the Columbia River.

The town lies northwest 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 one hundred and thirty-five houses of all descriptions. In 1860, the population was five hundred and fifty-three, and the number of houses one hundred and seventy-six.

The lands adjacent are being cultivated; a grist-mill has been built which turns out seventy-five barrels of flour per day, and a good trail leads to the "diggings" on the Klamath and Illinois Rivers.

The southwest point of the bay is elevated about twenty-five feet and continues so to the westward. The light-house is erected on the rocky islet about three hundred 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 11*h.* 44*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. Tebenkoff calls this bay San Sebastian.

CRESCENT CITY LIGHT-HOUSE.

The building consists of a keeper's dwelling of stone, the natural color, (gray,) and one and a half stories high, with a low tower of brick, plastered and white-washed, rising from the center 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 forty-five feet above high water.

The light is a *fixed white light, varied by flashes*, of the fourth order of Fresnel. The intervals 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 eighty 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 north by west seventy-nine and a half 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 west by north from Crescent City light. It is from fifty to one hundred feet high, with table-land some distance back. It is bounded by hundreds of rocks, some of which rise perpendicularly two hundred 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.

Nine miles southwest one-third west from Cape St. George, Tebenkoff gives forty fathoms of water, and twelve miles northwest half west from the cape he gives sixty-five fathoms.

The point may possibly be the Cape San Sebastian of Vizcaino, who, after the

N.W. Compass

Pt. St. George, N by W. Compass distant 12 miles

La. Ho.
Crescent City N. by E. ½ E.

separation of his vessels, continued his explorations northward, and on January 20, 1603, when in latitude 42° north, 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° north, where the land formed a cape or point, which he called Cape Blanco, and from that point the land ran northwest. 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′ north.

DRAGON ROCKS.

This name is applied to the rocks and reef extending west-northwest 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 ten or twelve outlying rocks, and many sunken ones. The outermost rocks are two, about half a mile apart, large, black, and bold. The outer bears west by north three-quarters north from the Crescent City light, and the next inside bears west by north half north from the light. No others show above water for nearly two miles towards the light. The passage through is about a mile in width, has ten fathoms in it, and the general course through is nearly northwest and southeast, but not straight. Among the multitude of rocks on the land side of the passage are three very large and prominent ones about two hundred 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.

The steamship Brother Jonathan was recently lost on this reef in a fog by mistaking some of these islets, and a great many lives lost.

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 125th degree of longitude. This line moves southward about a mile and a half annually.

PELICAN BAY.

From Point St. George the coast runs straight for twelve miles north half west; thence west-northwest for nine miles, forming a deep indentation called by La Pérouse, 1787, Pelican Bay, and by Vancouver, St. George's Bay. On the Coast Survey reconnaissance of it in 1850 it is named Pelican Bay. About four miles off the shore between Dragon Rocks and the Chetko River, Tebenkoff lays down thirty-

five and sixty fathoms, sandy bottom. 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 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 narrative of his trading expedition to the head-waters of the Mississippi, between June 1766, and October 1768. He did not penetrate beyond the 95th degree 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 Pend d'Oreilles tribe inhabited 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° north 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′ north, longitude 124° 15′ west, (both approximate,) empties a stream which is from fifty to sixty yards wide at its mouth, with banks about one hundred feet high, and bounded half a mile inshore 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 Tebenkoff's chart this stream is called the Striela or Arrow River.

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 called Mack's Arch, about forty feet high, in latitude 42° 11′, the course is northwest by north twenty-seven miles. The coast between the Chet-ko 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. The Coast Survey reconnaissance chart has a small anchorage marked in latitude 42° 17′, about five or six miles north of the arched rock. It is on the south side of a slightly projecting head; the surveying steamer did not anchor here. From the arched rock the shore runs nearly northwest by north half north for forty miles to Cape Orford, making a long gentle curve of four miles to the eastward, and being in general high, abrupt, and rocky.

CAPE SEBASTIAN.

This cape is in latitude 42° 18′ north, and longitude 124° 25′ west, approximately. When seen from a position seven miles southwest from the Chetko, the cape is a very marked and prominent headland, that so far has remained nameless. I propose that it be named Cape Sebastian. It is six miles north-northwest of Mack's Arch, and southeast by south two-thirds south, twenty-seven miles from Port Orford.

ROGUE RIVER.

Within the long stretch just referred to is found the entrance of Rogue River, in latitude 42° 25′ north, and longitude 124° 22′ west, (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 ten to eighteen 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 commence 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

N.by W. (Compass) distant 10 miles

Rogue's River N. (Compass)

Mack's Arch and Reef. N.W.by N. (Compass) distant 7 Miles

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 called Tar-shoots. Tebenkoff has the river Gunde opening in latitude 42° 22′; but he has a reef extending three miles off shore in latitude 42° 30′. He has the river Tituna emptying into Indian Bay or Port Orford in latitude 44° 45′.5. 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 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 west half north, about four miles from the north head of the entrance to Rogue 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.

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 one thousand feet high.

About eleven miles west by south from the mouth of Rogue River La Pérouse gives a sounding of eighty fathoms on his chart.

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 southwest point eastward to the main shore the distance is two miles, and from this line to the greatest bend of the shore northward the distance is one mile. The soundings within this space range from sixteen fathoms close to Tichenor Rock, forming the southwest 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 Rock. One mile off the shores of the bay the average depth is about fourteen fathoms, regularly decreasing in shore.

The point forming the western part of the bay presents a very rugged, precipitous outline, and attains an elevation of three hundred and fifty feet. Its surface is covered with excellent soil and with a sparse growth of fir. From this point the shore becomes depressed to about sixty 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 northwest by west 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, east by north, 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 in shore, 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 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 one and three-quarters 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, but we found none after careful examination.

Several attempts have been made to open a road from this place to the mines, about sixty or seventy 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 twelve 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 two hundred and sixty-two 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.	

Magnetic variation, 18° 29′ east, in November 1851, with a yearly increase of about 1 .

From this station Tichenor Rock bears south by west, three-quarters of a mile distant.

The secondary astronomical station (1853) is in front of the town, north of the Battle Rock, and within fifty 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 11*h.* 26*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 substract 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. On Tebenkoff's chart it is called Indian Bay, and the river Tituna empties into it in latitude 42° 45′.5. He has the characteristic high rocks to the southward close in shore, with 45 and 38 fathoms, three miles off.

From the western extremity of Port Orford, Cape Orford, or Blanco, bears northwest half north, distant six miles, the shore line between them curving eastward about a mile. Immediately north of Port Orford the shore is composed of a very broad loose sand beach, backed by a long, uniform sand ridge of one hundred 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, three and a half miles from Tichenor 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 one hundred 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 traveled 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 traveled nearly north about fifty miles.

CAPE ORFORD, OR BLANCO.

In making this cape from the northward or southward it presents a great similarity to Point Conception, 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 two hundred feet high, but the trees upon it make it appear at least one hundred feet more. The sides are very steep, and worn away by the action of the sea, showing a dull whitish appearance 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 one hundred yards from the beach.

The approximate geographical position of the cape is:

	°	′	
Latitude	42	50	north.
Longitude	124	30	west.

Cape Blanco, N. by W. ½ Compass distant 6 miles

Being thus the most western part of the main land until we reach latitude 47° 50.′

From it Cape Mendocino bears south by east seven-eighths east, distant one hundred and forty-five miles; Cape Disappointment light, at the north head of the entrance to the Columbia, north by west one-third west, distant two hundred and seven miles; and Tatoosh island light, off Cape Flattery, north-northwest three hundred and thirty-two miles. From the line joining Blanco and Cape Disappointment the coast does not, in any place, leave it more than twelve 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 one hundred miles trended north by east half east.

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.

Fifteen miles west by north from Cape Orford, La Pérouse states that he had soundings in seventy-five fathoms.

ORFORD REEF.

About four 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 west three-quarters north, distant four and a third miles from the western point of Port Orford, and the general direction of the six others is north-northwest from Fin Rock. West from Port Orford, and distant four and a half miles, is a small black rock, and near it a smaller one, upon which the sea breaks only occasionally. West by north half north, distant four and three-quarters 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 south-southwest 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 northwest by west, 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 north-northwest, 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 Pérouse says his latitude at noon was 42° 58′ 56″, and that two hours afterwards, in latitude 42° 49′ he was abreast of nine small islands or rocks lying about a league off Cape Blanco, which bore northeast by east true. He called them the Necker Islands; evidently the group forming the Orford Reef.

About two miles westward of the reef, Tebenkoff gives a sounding in forty-three fathoms.

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 Pérouse 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. But his description shows that he did not see the above headland.

From Point Boneta to Cape Orford the extent of shore-line is three hundred and eighty-eight miles, Boneta to Mendocino being two hundred and twenty three miles.

GENERAL FEATURES.

From Cape Mendocino the hills upon the seaboard range from two thousand to three thousand feet high, running parallel with the coast at a distance of from three to five 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 seventeen miles, with a slight curve of a mile and a half

eastward, and a short distance north of Orford it 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 seven to fifteen 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 propellor 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 two hundred 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 thirty miles in a northeasterly direction, and having a depth throughout of not less than fifteen feet, and an average width of forty 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 fifteen miles from its mouth there is a portage of one and a half miles to Koos River.

The hydrographic reconnaissance of this river in 1859, by the Coast Survey, shows only three 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 11*h.* 30*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 eighty-four 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.

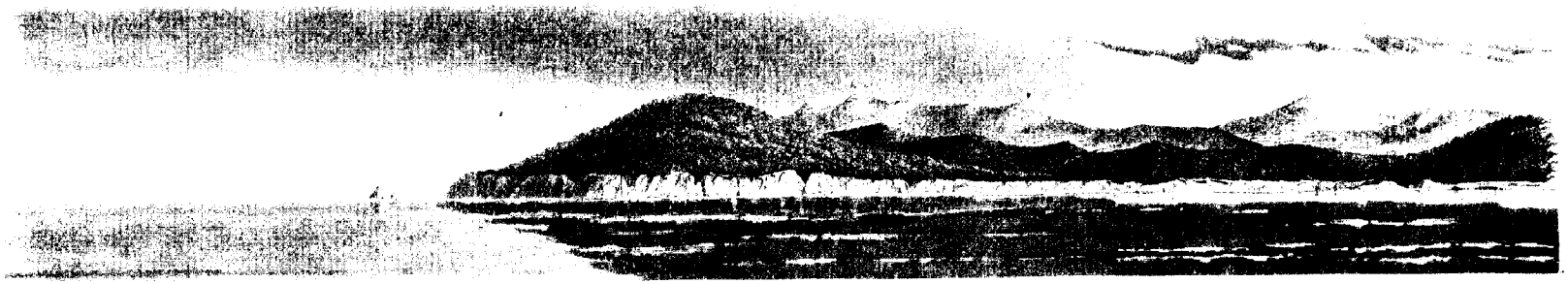
CAPE GREGORY.

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 two thousand 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 very narrow sharp perpendicular point, about forty feet high, and peculiarly cut and worn by the action of the sea. It forms in reality an island, covered with trees upon its southern part, and marked by the light-house on its northern extremity, beyond which rocks and rocky islets extend one-quarter of a mile. Thence it takes a sharp turn to the east-northeast for two miles to Koos Head, forming the south point of 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 ten fathoms are found one mile off. Officers of the Hudson Bay Company assert that some of their vessels anchoring close under the northwest face of the cape have ridden out heavy southeast gales; and the light-house steamer Shubrick has anchored close under the head in five fathoms water, in a southeast gale, putting to sea when the wind shifted to the southwest.

This is very important, because no other place between Drake's and Neé-ah Bays (latitude 38° 00′ to 47° 24′) affords such protection. If a southeaster should haul to the southwest, and then to the northwest, as they usually do, a vessel anchored in this position must be prepared to put to sea at once.

From the northwest point of the mainland of the cape the light-house island and rocks extend north 41° west nearly half a mile, with seven fathoms within a quarter of a mile of their extremity. The next point of rocks to the eastward of Light-house Reef is Yokam Point, nearly three-quarters of a mile east by north three-quarters north from the extremity of the former, and the shore of the mainland between them falls back with a low rocky face, bordered with a broad sand beach at low water. Three-quarters of a mile east by north three-quarters north from Yokam Point is Tunnel Point, with a bluff, wooded shore, bordered by sand beach at high and low waters between them. Within an eighth of a mile of Yokam Point soundings are laid down in seven fathoms, and also towards Light-house Point, but a detailed hydrographic examination has not been made to the shores. It would be important to sound out this space, and determine whether it is really available as a roadstead of refuge against southeast gales. It is directly open to the northwest.

Four miles broad off the southern part of the cape a depth of twenty-five fathoms is laid down; and on a course west by south three-eighths south from the light a line of soundings is laid down for ten and a half miles, at which distance seventy-five fathoms are given, with sixty fathoms within four miles of the light.



Cape Gregory, N. by W. (Compass) distant 6 miles

Beyond the outer sounding no bottom was found with one hundred and twenty fathoms of line. Thirty-eight miles north 58° west from Gregory light is the southern tail of the Hecate Bank, having soundings from forty-three to eighty-three fathoms, over variable bottom. This shoal runs thirty miles northward, parallel with the coast, and having eighty, seventy, and sixty fathoms between it and the shore.

LIGHT-HOUSE ON CAPE GREGORY.

This structure is on the narrow island northwest of the extremity of the mainland of Cape Gregory, and consists of an octagonal wrought-iron tower and lantern, painted white, with the dome of the lantern painted red. As seen from seaward, the tower is projected against the dark spruce foliage, and is readily recognized in day-time. The keeper's dwelling is a one-and-a-half-story wooden building, painted white, with green shutters to the windows, and is situated on the southern extremity of the island, about three hundred and fifty yards from the tower.

The light was first exhibited November 1, 1866, and shows from sunset to sunrise a *fixed white light, varied by flashes*. The duration of the steady exhibition is one minute and fifty-one seconds; of the eclipse three seconds; of the flash three seconds; and of the second eclipse three seconds. It is of the fourth order of Fresnel, and the height of the focal plane is seventy-five feet above the main level of the sea. In clear weather it should be seen from a height of—

10 feet at a distance of 13.6 miles.

20 feet at a distance of 15.1 miles.

30 feet at a distance of 16.3 miles.

From Cape Orford it bears north thirty miles.

The geographical position of the light as determined by the United States Coast Survey is:

	° ′ ″	
Latitude	43 20 36	north.
Longitude	124 22 11	west.
	h. m. s.	
Or, in time	8 17 28.7	

The computed magnetic variation was 18° 48′ east in 1863, with a yearly increase of 1′.

Cape Gregory 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.

KOOS BAY.

Nearly two miles east-northeast 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 one hundred 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. In 1861 the bar was northwest by west half west one mile from Koos Head; northeast by north seven-eighths north one and three-quarters miles from Cape Gregory, and its width between the twelve-feet lines on the north and south sides was only one hundred and fifty yards, with a maximum depth of thirteen feet. Thence the channel, increasing in width ran straight to the northeast tangent of the head, with ten fathoms of water abreast of that point. In 1853 and 1854 a depth of only nine to nine and a half 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. In October 1862 the surveying brig Fauntleroy could not enter. In October 1865 the channel had completely changed, and ran directly from the north point of the head north by west a quarter west one and a quarter miles, with a very narrow mouth between the breakers having four fathoms there, but only seven feet in the shoalest part of the channel five-eighths of a mile from the head. The entrance to the channel had thus moved five-eighths of a mile to the north-northeast. 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 the spring of 1868 the brig Admiral reported waiting in the bay thirty-one day's for a chance to got out over the bar.

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 was employed at the entrance to tow vessels over the bar. The saw-mills on the bay turn out about fifteen thousand feet of lumber daily, which is shipped to San Francisco.

The geographical position of the extremity of Koos Head, as determined by the United States Coast Survey, is:

	° ′ ″	
Latitude	43 21 02.9	north.
Longitude	124 19 48 3	west.
	h. m. s.	
Or, in time	8 17 19.2	

Tides.—The corrected establishment or mean interval between the time of the moon's transit and the time of high water is 11*h.* 26*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 two tides of the same day are generally unequal, in proportion to the moon's declination. The times and heights of high and low waters can be obtained approximately from the following table and explanation.

Moon's declination.	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High water.		Low water.		High water.		Low water.	
	Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
	H. M.	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*
Greatest north	12 26	5.6	20 08	—0.0	13 43	4.1	18 48	2.0
Zero	13 17	5.3	19 53	0.4	13 17	5.3	19 53	0.4
Greatest south	13 43	4.1	18 48	2.0	12 26	5.6	20 08	—0.0

The interval is to be added to the time of the moon's meridian passage to obtain the time of high or low water. The time of the moon's upper meridian passage is given in the Nautical Almanac; and the time of its lower meridian passage is the middle between the times of two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest low waters, to which the soundings on the chart are reduced.

Spring tides.—At the full and change of the moon the high waters will be 0.4 foot higher than the above, and the low waters 0.5 foot lower.

Neap tides.—At the moon's first and last quarters the high waters will be 0.4 foot lower, and the low waters will not fall as low by 0.6 foot.

Koos Bay is very irregular in outline, but its general shape is somewhat like the letter U, with the convexity to the north. One small branch, called the South Slue, stretches a mile or two southward directly behind Koos Head, but it has only two or three feet of water in it. North of the entrance the bay proper begins, and throughout its length there is a channel with a good depth of water. Abreast of the north point of the entrance the width of the bay is less than at any other point, being only six hundred yards wide at low water, but the depth of water reaches eleven fathoms. In this narrow part of the channel lies a sunken rock called Fearless Rock, nearly in the middle. It is best to pass to the westward of it, keeping the west side of the channel. The rock lies east from the termination of the north point of entrance, and west from Fossil Point. From the mouth of the South Slue the bay runs north by east quarter east six miles; then east-northeast nearly two miles to North Bend Point; then southwest between three and four miles. The average width to the north bend is three-quarters of a mile. The southwest arm has a width increasing from one to two miles, but the whole eastern part is bare at low water. Koos River empties into the southeast part of the bay and Coal Bank Slue into the southwest part. At the north bend two large slues come in from the north,

and a short triangular one from the south. Koos River is said to afford passage for boats for twenty miles from its mouth, where a small slue 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 fifteen miles from the mouth of the Coquille.

Empire City is a place of about twenty houses, on the east side of the bay; three miles from the entrance a wharf from the upper mill extends into sixteen feet water. The Coast Survey has published a chart of the bay and approaches.

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 spruce and pine. Little 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 head of the bay, on Coal Bank Slue.

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 land-locked 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 125th degree of longitude. This line moves annually southward about one and a half miles.

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 ten to fifteen 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 fifty-one miles north one-third west from Cape Orford, and twenty-one miles north of Cape Gregory. The lower reach of the river is long and narrow, running nearly north for six 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 three hundred yards of the south side of the entrance, through which narrow space runs the channel, having (1853) a bar with only thirteen feet upon it, and less than a hundred yards wide. From the bar the point of bluff, just inside the entrance, bears northeast by east, and is distant one and a quarter miles. 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.

Although the directions of one year will not answer for another, it is desirable to keep on record such conditions as have been observed, to study the law of changes of the channels. 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, were placed in line with the light-house, which bore from them east by north quarter north. The inner buoy was just within the bar, and in three and a half fathoms at mean low water, and could be passed on either hand, but only close to it. The outer buoy was just outside the bar, in ten fathoms at the same stage of the tide, and could also be passed on either hand. Keeping the two buoys in range with the light-house that then existed, a depth of fourteen feet was carried over the bar at mean low water.

The above directions show that the bar of the river had moved about four hundred yards to the northward of its position, as determined by the hydrographic survey of 1853, and had, 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 Survey 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. 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 warrant the necessary expenses.

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 three-quarters of a mile northward of its former position, with a depth of three and a half fathoms water.

UMPQUAH RIVER LIGHT-HOUSE.

The tower of the light-house, ninety-two feet in height, was erected in 1857, on the south side of the entrance, close to the beach, which was of shifting sand. On the 8th of February 1861, during a heavy freshet in the river, the base of the tower was undermined and the structure fell. No building has replaced it, but the light at Cape Gregory is sufficiently near to be used for marking the position of the river entrance. The English Admiralty Chart No. 2461, with corrections to March 1865, still has this light-house marked as existing.

THE RIVER INSIDE THE ENTRANCE.

After crossing the bar the channel runs close to the south shore, and increases in depth from three and a half fathoms to thirteen 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 east-northeast to the other shore, close along which the channel runs. This course takes them clear of a flat and rocks in mid-river, which bear east-northeast 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. It has no water, 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 spruce, 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 two hundred and sixteen feet to its lowest branches, and being fifty-seven feet in circumference.

Tebenkoff has the entrance and Indian village at the mouth in latitude 43° 56′.

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 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 north by west half west 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. In latitude 43° 58½′, two and a half miles above his position for the Umpquah en-

Cape Perpetua N. by W. ¼ W. (Compass) dist. 8 miles

trance, Tebenkoff has a small indentation called Sidman Bay, but no indication of this is found on the Coast Survey reconnaissance. In latitude 44° 08½′ he has a large stream entering, about five miles south of Perpetua, and called the Zastikan River.

Sixty-six miles northwest by north from Cape Orford is the southern end of a bank extending parallel with the coast for thirty miles, and about the same distance from it. The least depth yet discovered upon it is forty-three 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 eighty 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.

HECETA HEAD.

The seaward face of this headland is about one and a half or two miles in extent, and the northern extremity in latitude 44° 09′, approximately. It is quite noticeable when coming from the southward as being the northern limit of a long extent of low sand dunes, backed by low, wooded hills, stretching from near the Umpquah River. Northward of it the shore is moderately high, but broken by sandy patches of sloping bluff. The summit of the head is about eight hundred feet above the sea, and covered with wood, but the seaward face is green to the edge of the cliff. Two small cascades are seen near the southern part, and a small sandy cove near the northern. To the westward of this cape lies the Heceta bank.

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 fifteen miles, when the hills stretch out to the shore and crowd upon it for thirteen miles, to end abruptly in steep bluffs forming Cape Perpetua, which is thirty-nine miles north by west half west from Umpquah light. 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.

The approximate elevation of this wooded headland is eight hundred feet. It lies about south 19° east, twenty-four miles from Cape Foulweather, and is in latitude 44° 19′, with the coast line running almost straight to the latter point. The

south face of the cape stretches about a mile to the eastward, and the face is sharp, bold, and rocky. One mile north of it is the entrance to the small stream named the Ya-chats, on the north bank of which is the Indian agency of Alseya.

Mount Ya-chats, estimated at two thousand feet elevation, lies north 37° east, five or six miles distant from Cape Perpetua.

Two and a half miles north of Perpetua the shore changes from a bold, rocky outline to a sand beach, bordered with timber almost to the water's edge.

At eight and a half miles northward of the cape is the entrance to the Alseya River, with a broad sandy point forming the north head. The river expands nearly to the size of the Yaquina, but the depth of water upon the bar is unknown. For four miles northward of this river to the Seal Rocks the shore is marked by sand dunes; thence to the mouth of the Yaquina River the shore is low and heavily wooded.

YAQUINA RIVER.

As seen from the southwest the entrance to this small river exhibits a high, bold, sandy bluff on the north side, with a clump of spruce or pine on the top, near the southern extremity. Stretching three-eighths of a mile south by west from this bluff is a broken line of low, black rocks. The south point of the entrance is lower than the north, not bluff but sandy, and heavily timbered to within a short distance of the beach. When the entrance has the above bearing, the low extremity of the south point is seen inside, in line with the end of the low black reef. A small house on the inner side of the south point just opens out from the north line of the timber; and the line of breakers across the entrance stretches from the rocks to the southern shore. The topography of the country behind the shore exhibits hillocks covered with pine, and rising to elevations of about three hundred feet to the base of the Coast mountains, about four or five miles from the ocean, and heavily timbered to their summits.

The north head is the extremity of a peninsula about one mile long and half a mile wide; its sea-shore stretches northward for about three and a half miles to the point designated Cape Foulweather on the Coast Survey maps. The shore is a long line of bluff composed of hard sand and soft rock, from one to two hundred feet in height.

The bar of this river lies at the south point of the reef, making out three-eighths of a mile south from the north head, and is about half a mile broad off the south point. It is quite narrow, and never free from breakers except at extreme high water, when it appears about half a mile wide. The depth of water upon it is not over nine and a half feet at low water. A vessel drawing eight and a half feet has been taken over at dead low water, just touching her keel. The water on the bar is reported smoothest in June, July, and August. The current is very strong in the channel between the heads, being estimated at five or six knots when strongest; a whale-boat cannot pull against it. The summer winds are favorable for both entering and leaving. It is reported that southeast gales do

Entrance to Yaquina Bay, Oregon, Lt. Sig. Beacon bearing N. by E. ¾ E. distant 2¼ Miles.

not change the bar, and this appears probable on account of the rocky nature of the north side.

The geographical position of this river has not been accurately determined; it is approximately placed by the United States Coast Survey in—

	° ′	
Latitude	44 36.2	north.
Longitude	124 04	west.
	h. *m.*	
Or, in time	8 16	

About three-quarters of a mile from the shore, and one-quarter of a mile outside the bar, a very dangerous reef of rocks extends in a north and south direction, having many small, narrow, and dangerous channels across it. This reef is one and three-eighths mile long, and lies between the bearing of outer range beacon northeast by east, and the same beacon bearing east by south three-quarters south. It is composed of a great number of rocks, with from six to eighteen feet upon them at low water, and separated from each other by channels of various widths from twenty yards to three-quarters of a mile. Inside of the reef is a channel running nearly north and south one-quarter of a mile wide, and bounded on the eastern or inshore side by the breakers of Yaquina Bay.

This reef, which forms such a dangerous obstruction to the approaches to this river and bay, serves, however, as a natural breakwater against the westerly seas, which would otherwise render this bar impassable except at high water, and in the smoothest weather. As it is, in heavy weather it is not possible to cross the bar. There is a very dangerous sunken rock with twelve feet at mean low water, which lies to the right of the entrance, and a little over a mile off the shore. From this rock the western range beacon bears northeast by north half north, and is distant two miles. The beacon on the north head bears north by east half east, and is distant two and one-eighth miles. These bearings will enable vessels to avoid the shoal.

Trade was drawn hither by the oyster beds in the river. These have been exhausted, and a small traffic is maintained in lumber. There is one saw-mill there, cutting eight to ten thousand feet per day.

Inside the bar, Newport is located on the east side of the north head; and the river has a general course northeast by east three-quarters east, for twelve miles to Elk City, the commencement of the military road to the Willamette Valley. But, by the windings of the river, the distance is about twenty-three miles. In that distance it makes a course like the letter S repeated. For two and one quarter miles the north shore of the river runs about northeast by east three-quarters east, with a width of one mile, filled with flats; thence it makes a large bend to the southeast for three and a half miles; and, sweeping north again, touches the line between Newport and Elk City about seven and a half miles from the former, where it receives a small stream from the north, and is only five or six hundred yards wide. Then bending again for two and a half miles to the south,

and turning rapidly north, it crosses the above connecting line with a width of two hundred and fifty yards at ten miles from Newport. It continues north of this line for a mile, then sweeps south two miles beyond the above line, and returns northward to Elk City, the head of tide-water, to which a depth of nine feet can be carried. In the first great bend two small islets are found where the river expands. Its banks are covered with a thick growth of spruce, pine, and alder. A small steamboat plies occasionally between Elk City and Newport.

About three miles north of the entrance is the headland known as Yaquina Point, whose grassy heads, when two or three miles off Yaquina River, show against the bolder and marked head of Cape Foulweather. It has a high, bold point, extending into the sea about a half or three-quarters of a mile from the beach southward. It has on it two conical hills, between three and four hundred feet high, and exactly similar in shape. There is no trace of its ever having been wooded. It is in latitude 44° 40′ north, and longitude 124° 04′ west, and will serve as a good mark for making the mouth of the Yaquina.

A beacon has been built upon the north head, as a guide in making the entrance, and two beacons are placed on the south point, west by south half south, and east by north half north of each other, as a range for crossing the bar. They are about four hundred yards apart, and form an excellent channel mark.

SAILING DIRECTIONS.

This bar and entrance was surveyed by the Coast Survey in 1868. The sailing directions given below are compiled from the results of that examination.

Coming from the southward, vessels should first make Cape Perpetua, twenty-two and a half miles to the southward of the mouth of the Yaquina, and, if possible, keep the shore in view up to the entrance. Cape Perpetua may be recognized by its steep bluffs, thickly wooded, which jut out boldly into the water, and by the view given of it in this work.

After sighting Cape Perpetua steer north a little westerly for the Yaquina. When up with the entrance, bring the beacon on the north head to bear north-northeast, and steer for it one and one-eighth miles, until the outer or western range beacon bears northeast, when you must steer north one-third west for a little over half a mile, until you bring the two beacons in range. Cross the bar on this range, steering east by north half north, and continue this course until you bring the beacon on the north head to bear north by west half west, when steer north by east three-quarters east, and round the point at a distance of about one hundred yards, until abreast of the town of Newport, when you may anchor in from four to five fathoms.

Of these courses, the first (north-northeast) carries you about four hundred yards to the northward of the detached rock mentioned above, and you will have nothing less than five fathoms. The second (north one-third west) passes one-eighth of a mile to the eastward of the outer reef, and has nothing less than four

fathoms. In crossing the bar your shoalest sounding will be nine feet, and will carry you closer to the south breakers than to the north. In one place the range passes within sixty yards of the edge of the breakers. But, as the depth is uniform here, you may, should you get too close to the south shoals, edge a little over to the northward without fear of finding less water.

Coming from the northward vessels should sight Cape Foulweather, run in to within one and a half mile of it, and steer southeast by south quarter south until they are in fifteen fathoms, and have the beacon on the north head bearing east quarter south. Now steer for the beacon and continue your course for a little over one and a quarter mile until the extreme western point of Cape Foulweather bears north-northwest, when haul round south-southeast, which course you must continue for five-eighths of a mile, until you bring the two beacons on the south head in range, when you must cross the bar on the range and proceed as before directed.

Of these courses, the first (east quarter south for the north beacon) leads across the northwestern end of the outer reef, through a break in its line, and between two rocks with eleven and twelve feet on them at low tide. The course gives both rocks a berth of at least one hundred and fifty yards, and you will have nothing less than four fathoms at low water. The second course (south-southeast) carries you up the channel between the outer reef and the bar, in nothing less than four fathoms, and brings you to the bar. You cross the bar in the same water and on the same range as in entering from the southward.

The Coast Survey chart of Yaquina Bay entrance shows the depth of water on the bar and approaches at mean low water, the soundings being reduced to the mean of the lowest low waters.

Tides.—The two tides of the same day are generally unequal in proportion to the moon's declination. The time and height can be obtained approximately from the following table:

Moon's declination.	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High water.		Low water.		High water.		Low water.	
	Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
	H. M.	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*
Greatest north	11 17	7.7	18 09	—0.4	12 25	6.1	17 51	3.0
Zero	11 59	7.8	18 09	0.8	11 59	7.8	18 09	0.8
Greatest south	12 25	6.1	17 51	3.0	11 17	7.7	18 09	—0.4

The interval is to be added to the time of the moon's meridian passage to give the time of high or low water. The time of the moon's upper meridian passage is given in the Almanac, and the time of its lower meridian passage is the middle between two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest low waters, to which level the soundings on the chart are given.

Spring tides.—At the full and change of the moon the high waters will be 1.0 foot higher than the above, and the low waters 0.6 foot lower.

Neap tides.—At the moon's first and last quarters the high waters will be 1.0 foot lower, and the low waters will not fall as low by 0.6 foot.

YAQUINA POINT.

From Perpetua to this cape the soundings range from seven to twelve fathoms about a mile from shore. The cape is in latitude 44° 40′ north and longitude 124° 04′ west, (both approximate,) 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 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. These opinions have since been verified by the surveying parties of the Coast Survey, who have since landed on this part of the coast, and completed its examination.

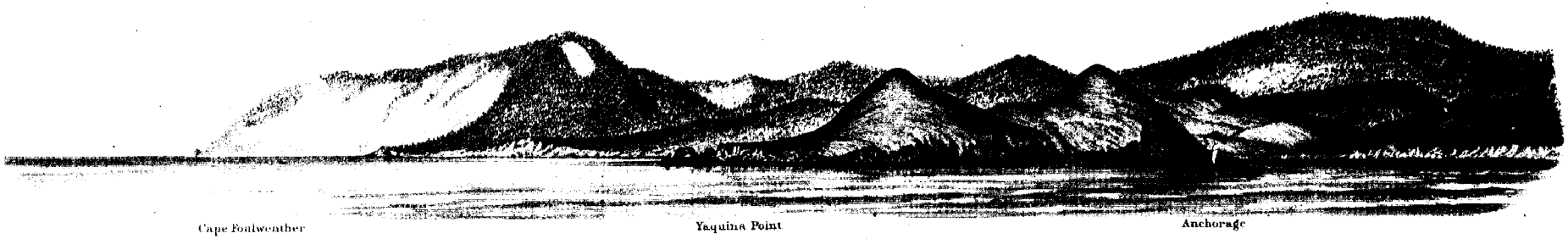
In moderate northwest winds anchorage may be had under the two grassy heads of Yaquina Point in four fathoms, sandy bottom, about three hundred and fifty yards southward of the rocks, with the islet one-third of a mile inside, the cape bearing west by north two-thirds north. This position will be about three hundred yards from the line of three fathoms water to the eastward, and nearly half a mile from the beach. The soundings do not indicate any hidden dangers. Boat landing may be sometimes had on the south face of the rocks, but never on the beach.

The two grassy hills of Yaquina Point are three hundred and sixty and four hundred and seven feet high, with wooded mountains of one thousand feet elevation a mile or two eastward of them. These grass hills form a peculiar feature for making this headland.

CAPE FOULWEATHER.

Nearly four miles northward of Yaquina Point commences the long, bold face of this headland. From Yaquina Point the four miles of shore is bordered with low, yellow broken cliffs, covered with standing burnt timber. A low, flat, black rock lies about half a mile off shore, and nearly three miles north of the point, while a large one, the same distance off shore, lies just south of the southern limit of the cape.

The whole face of the cape is about five and a half miles in extent, north-northwest and south-southeast, and marked by six or seven sloping grassy heads, reaching from the sea-cliffs to the heavy timber which crowns them, while timber



Anchorage under Yaquina Point, the Point bearing N. $\frac{3}{4}$ E. distant $2\frac{3}{4}$ Miles

fills the gulches between them. The elevation of the head appears to be about eight hundred feet.

The westernmost point of the cape is about seven miles northward of Yaquina Point, and is marked by a low grass-covered table projecting just to the northward. North of this table, and behind a black point of the same height, stretching southward, is an opening to a small cove, with yellow cliff and sand beach within, upon which no surf was seen. It seemed probable that a boat-landing could be safely effected there in ordinary northwest winds. This black point is marked by a dense cluster of woods.

The northern extremity of the cape is about nine and a half miles from Yaquina Point; thence northward the shore is comparatively low, and bordered by a sand beach.

This cape was named by Cook on the day he made the coast, March 6, 1778. At noon he was in latitude 44° 33′, and the land extended from northeast half north to southeast by south, about eight leagues distant. In this situation he had seventy-three fathoms over a muddy bottom, and ninety 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. 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, seven miles north of the head called Cape Foulweather on the Coast Survey charts.

If we plot Cook's bearings we find that in latitude 44° 33′, longitude 124° 23′, they cut the northern part of the highland of Cape Foulweather in latitude 44° 52′ twenty-three miles distant; and the southern part of Cape Perpetua in latitude 44° 16′ twenty-two miles distant; while the low shore directly east is distant fourteen miles, and backed by high hills. Seven miles outside of the position where he got seventy-three fathoms, the Coast Survey lay down no bottom at one hundred fathoms. Tebenkoff gives seventy-three fathoms, sandy bottom, eight miles from shore, in latitude 44° 32′, but the bearings of Foulweather and Perpetua place this sounding only five miles off shore.

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, the north point is marked by the southern extremity of a low, yellow bluff, which runs northward three or four miles to the grassy hillocks south of Cascade Head. 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.

In latitude 45° 2′ Tebenkoff places the mouth of the river Yacoun; while in latitude 45° 32′, on the north side of La Mesa, he has the river Nikas.

From the Nekas to Cape Lookout the distance is twenty-four miles, and course north by west half west, 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.

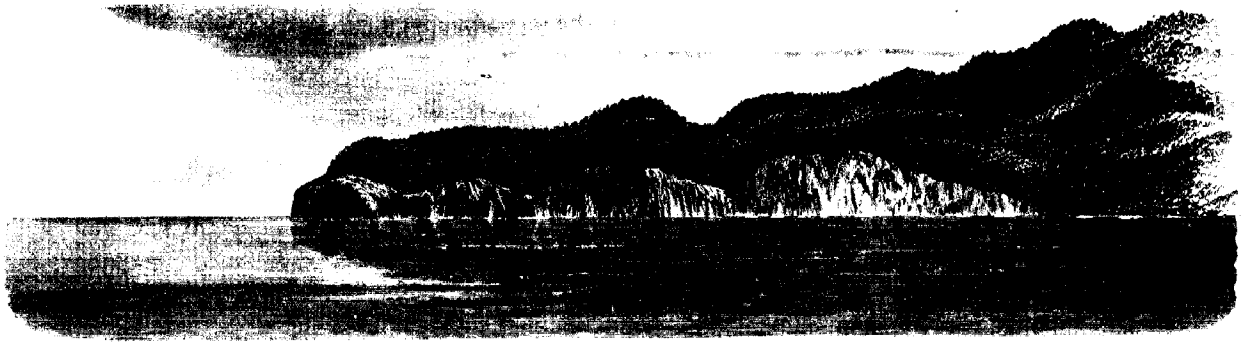
De Mofras has Cape Lucuat in this latitude, and a small stream, River Kaouai, south of it.

CASCADE HEAD.

In latitude 45° 03′, longitude 124° 02′, (both approximate,) a jagged headland, with a sea-face of about one mile in extent, shows prominently when a vessel is close in shore. The south face, overlooking a cove, is without trees and shows very green. The top of the ridge which attains an elevation of about six or seven hundred feet, is covered with spruce trees; also the ocean front except where it is very steep and rocky, and at the single gentle slope near the northern extremity, at the foot of which a large cavern is seen. About midway along the face of the cape, and halfway up, is an exposure of red rock showing plainly when the sun is shining upon it. About two-thirds of the distance from the southern extremity of the cape a sharp valley makes out directly upon the sea, and a cascade from a height of forty or fifty feet falls upon the rocky shore. Four hundred yards northward of this a smaller stream of water leaps from the rocks, but it is soon shut in. These peculiarities have caused us to name it Cascade Head. When approached from the north, with the southern extremity of the cape bearing south by east, two rocks appear just touching the south point. The outer one is comparatively low and broad, with two arches through it; the inner arch is the larger, and through it is seen the beach beyond.

As seen from the southward this cape is particularly noticeable by having two or three great spruce trees standing alone and above the surface of the second higher seaward slope, at an elevation of perhaps five hundred feet.

A small indentation of the shore makes in a few hundred yards southward of the head, from which stretch out three large black low rocks, apparently affording



Cape Lookout N. by W. (Compass) dist. 10 miles

protection for a boat landing in ordinary northwest weather. The width of this cove we estimated at about half a mile, and the depth the same. At the head of it there is the opening of a small valley, through which comes a stream with a shanty near its bank. This may be the Nechesne River of the Coast Survey reconnaissance chart. The south side of the cove is formed by the grassy head of a ridge, about three or four hundred feet high, running southward and forming the shore for two or three miles, and decreasing in elevation to only thirty or forty feet above the ocean. It is without timber, and, as seen from the sea, is beautifully green and rolling. South of this, again, for four or five miles the immediate shore is low and sandy with signs of a lagoon or marsh inside; perhaps the waters of the Nekas.

At the north of Cascade Head the shore retreats somewhat and a steep-sided, timbered valley opens upon the sandy beach, where the timbers of a wreck were distinctly visible as we passed within a mile of them in July 1867. The valley appears to run southeastward between high hills. From the mouth of the valley northward there are undulating hillocks pleasantly green from summit to beach, which continue to the opening of a stream which, by the run of the steamer, should be about nine miles north of the south part of Cascade Head. The outer and northern bank of this stream is sandy, increasing to sand dunes for some miles. The outermost point of the sand beach has a high rock off it. The eastern or left bank of this stream has high hillocks covered with spruce, and behind them appeared to be a valley stretching far to the southeast with a high timbered ridge flanking its eastern side.

About twelve miles from the south part of Cascade Head is a high rocky islet of regular shape, named the Haystack. It appears to be nearly half a mile off the point, and possibly has a passage around it. When abreast of it, a large slit, half the height of the rock from the sea, shows on the north side, as if an irregular slab of rock were lying against it. The measured height of the Haystack is three hundred and seven feet, and it is approximately off the position assigned to the Nawuggah River on the Coast Survey chart, in latitude 45° 13′. Tebenkoff puts it in latitude 45° 11½′, with a stream, called the Kautie, emptying four miles north of it. The Haystack is marked on the Coast Survey chart. Half a mile northward and eastward of it is a low cavern-worn yellowish cliff of sandstone, with its top covered with grass, and the inshore slope with timber. A ridge of drifting sand lies inside this hillock, which is about one hundred and fifty feet high. About half or three-quarters of a mile north of this cliff, called Haystack Point, a very small stream of water is seen cutting through the sand beach at low water.

CAPE LOOKOUT.

The soundings from Foulweather to this cape show from thirteen to thirty-one fathoms of water at a distance of a mile or a mile and a half from the shore, increasing from eighteen fathoms, north of latitude 45° north.

This cape is situated in latitude 45° 20′, longitude 124°, both approximate. It projects half a mile sharply into the sea, and there appears sufficient protection under the south side for boat-landing in ordinary northwest weather, and possibly space for a small steamer to anchor close in. As seen from the southward the top of the cape is tolerably flat and regular, and at the highest part we judge it to attain an elevation of nearly three thousand feet. The face directly toward the ocean is not more than a quarter of a mile wide, about five hundred feet high, rocky and perpendicular; above that elevation the cape rises rapidly and is covered with spruce, except the southern slope, which is destitute of trees, but green, with herbage above the perpendicular rocky bluff, which is marked by small caverns. On the ocean face is a very large deep cavern. No rocks lie off this cape, but one appears very close inshore about a mile to the northward of it. As seen from the north it is arched. About eight miles to the southward is the large single Haystack Rock off the Nawuggah River, three hundred and seven feet high, and standing well out from the low sand beach behind it.

Five miles broad off Cape Lookout, Tebenkoff gives one sounding in fifty fathoms over sandy bottom; and thirteen miles off the cape he notes the current running north half east. The Coast Survey chart gives one hundred and thirty fathoms over muddy bottom thirty-two miles west by north one-quarter north from Cape Lookout.

The name Lookout is that adopted 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 Davidson's examinations of 1857 and 1867.

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 125th degree of longitude. This line annually moves about one mile southward.

CAPE MEARES, OR LA MESA.

Two or three miles after passing Cape Lookout the land falls to a low sand beach. Behind the beach is a long lagoon, called the Nat-a-hats, coming from the southeastward, stretching northward parallel to the ocean beach, and opening under the south head of the well marked point named Cape Meares. This cape is the termination of a timbered spur or ridge running from the southeastward, presenting an abrupt front to the ocean for about two miles, and forming the southwestern boundary to Tillamook Bay. The face of the cape is high, broken and bluff, and increases in elevation as it retreats from the shore. It is covered with spruce. The northern end of the cape shows a thin bright stratum of yellow earth on top of the brown rocky shore, and about two hundred and fifty feet above the water. We estimated the elevation of Cape Meares about one thousand two hundred feet above the ocean. Approached from the southward four large brown rocks show off the cape, and two of them are marked by arches through them.

The rocks are about one hundred and fifty feet high, except the outermost, which is comparatively small. The arches through three of this group are only seen from particular directions. The inner arch is visible from the southward when close in shore; the outer one from south half east; and "Meares Arch" from the northward. 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 Cape Falcon from the northward, 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 125° 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.

The entrance of this bay is about four miles north of Cape Meares, and in latitude 45° 34′, longitude 123° 57′, both approximate. From Cape Meares the land falls to a straight, low, narrow ridge of sand dunes running northwest by west, and covered with spruce for three miles; then with grass and bushes for another mile to the entrance to Tillamook Bay. The hillocks of this peninsula appear to be

only forty or fifty feet high. The north side of the entrance to this bay rises sharply to wooded hills, twelve hundred feet high. Just inside the entrance, and on the south face of the hills, is a bright green spur destitute of timber, from the lower part of the hills to the water's edge. This spur, named Green Hill, is a prominent feature in recognizing the entrance and in crossing the bar. The highest part of this hill that is destitute of trees is about four hundred and twenty-one feet.

Upon the Coast Survey chart there is laid down a single rock four miles southward of the entrance, and three-quarters of a mile off the beach. About one and a half miles north of the bar, by estimation, is a double-headed rock, connected with the beach at low water, with no rocky ground near. These rocks are gray, about eighty feet high, and seen projected against the bright sand beach from which the wood commences to cover the hills. The southern one has an arch through it, as seen from the south.

The entrance to Tillamook Bay is six hundred yards wide, but the channel between the twelve feet curves is only one hundred and thirty-five yards wide. The narrowest part, with a depth of from four to eight fathoms, is close to the foot of the Green Hill, and the breakers always show the south side of the channel. The two points of the entrance are north one-quarter west and south one-quarter east of each other.

The bar in April 1867 lay southwest by west half west one and a third mile from the foot of Green Hill, and three-quarters of a mile southwest by south half south from the nearest part of the north head. The channel was narrow but quite straight, and a depth of fifteen feet could be carried across the bar at low water. Outside the bar the depth increased rapidly to five fathoms in an eighth of a mile, and one mile outside the bar the depth was nineteen fathoms. The directions for entering were to bring the highest part of Green Hill to bear northeast by east, and run for it over the bar. After crossing the bar, gradually haul for the lower part of the hill. When its extremity bears north-northwest steer for the eastern shore of the south point, running close to it in twenty-six feet water, with a hard, fine sand bar, with only four feet upon it two hundred yards from the shore.

The geographical position of the Coast Survey station at the base of Green Hill was determined approximately, and is in—

	° ′
Latitude	45 32.8 north.
Longitude	123 57.9 west.
	h. m. s.
Or, in time	8 15 52.

The computed magnetic variation for January 1868, was 20° 40′ east, and the increase about 1′ yearly.

The United States Coast Survey published in 1867 a chart of this bay and entrance.

TIDES AT TILLAMOOK BAY.

The two tides of the same day are generally unequal in proportion to the moon's declination. The times and heights can be obtained approximately from the following table:

Moon's declination.	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High water.		Low water.		High water.		Low water.	
	Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
	H. M.	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*
Greatest north	11 13	7.3	18 45	—0.6	12 44	6.2	17 58	2.0
Zero	12 30	7.0	18 40	0.3	12 30	7.0	18 40	0.3
Greatest south	12 44	6.2	17 58	2.0	11 13	7.3	18 45	—0.6

The interval is to be added to the time of the moon's meridian passage to give the time of high or low water. The time of the moon's upper meridian passage is given in the Almanac, and the time of its lower meridian passage is the middle between two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest low waters, to which level the soundings on the chart are given.

Spring tides.—At the full and change of the moon the high waters will be 0.5 foot higher than the above, and the low waters 0.7 foot lower.

Neap tides.—At the moon's first and last quarters the high waters will be 0.5 foot lower, and the low waters will not fall as low by 0.7 foot.

Inside the entrance of Tillamook Bay its general direction is southeast by south half south for two and a half miles, then east five-eighths south for two and a quarter miles. It rapidly expands as it stretches southward, and there is a small shallow cove lying to the northward and eastward of the parallel of Green Hill. The bay is mostly occupied by flats that are bare at low water. The principal channel through it runs from the inside of the south point of the entrance towards the southeast part of the bay; and after reaching the middle of the bay, just south of Mematnet head, it runs parallel with the eastern shore at an average distance of half a mile, until abreast of Shell Point, when it runs southward a short distance and abruptly turns to the southeast, running close along shore. It is said that vessels drawing eight or ten feet of water can go up the slue about six miles above the head of the bay at high water. Up to 1867 there had been three vessels built here, the largest about forty tons burden. One of these was engaged, in 1867, in making occasional trips to Portland for flour and other supplies. The exports consist of a little butter and some few hides. The whole imports and exports do not exceed fifty tons yearly. There is a considerable amount of timber, consisting of spruce, fir, hemlock and cedar, adjacent to the bay, but as yet nothing has been done to develop its value.

Tebenkoff has a deep indentation of the coast in the position of Tillamook

Bay, and gives the rocks to the southward and those to the north. Emptying into the southern part of this bight he has the river Nikas.

NEHALEM RIVER.

About one and a half miles north of Tillamook Bar stand the double-headed rocks described above; thence the coast runs ten or eleven miles nearly straight to Cape Falcon, receiving a considerable stream called the Nehalem River.

The opening to this stream is in latitude 45° 41½′, approximately, and for three miles from its mouth it lies parallel and close under the west side of a bluff covered with timber and running nearly north and south. Around the northwest point of the bluff the stream comes sharply from the eastward and is about three-quarters of a mile in width at high water, with eighteen feet depth at that stage of tide. Between the river and the sea lies a long, narrow strip of sand dunes, having a breadth of four hundred yards and a general elevation of twenty five feet. At the southern extremity of the sand dunes the point runs one mile further at low water. Abreast this point the river contracts its width to two hundred yards with very little depth of water, while upon the bar the sea breaks almost unceasingly. Inside and abreast the southernmost sand dunes there is as much as thirty feet depth of water, with a rocky ledge on the eastern side.

The entrance to the river from the bar to the northwest point of the bluff was examined by the Coast Survey in 1868.

In July 1867, when passing northward close along the coast we found the Nehalem entering abreast of a red break in the low wooded bluff about six miles north of Tillamook Bar. It comes from the northward about one mile close under the bluff, with a low narrow sand-tongue between it and the ocean. The inside bluff retreats eastward and thence this tongue increases in height northward and becomes covered with grass and trees. Inside of it the Nehalem spreads into a lagoon four miles wide with a length of eight miles, where it decreases in width. The general direction of the lagoon is north-northeast. The hills behind the Nehalem appear cut by many valleys. The tongue forming the ocean boundary to the lagoon runs north-northwest to a double-headed peak, about three-quarters of a mile south of Cape Falcon. This peak (about twelve hundred feet high) is grass-covered to the summit, with a few burnt trees in the gorges. It is known by the Indian name of Ne-ah-kah-nie. At the base, on the south side of the mountains, is a large house.

Tebenkoff has a stream, designated the river Nuhalem, emptying in latitude 45° 54′, but this position is close under Tillamook Head.

Clarke, when about five miles south of Tillamook Head, says that the principal town of the Killamucks is situated twenty 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, one hundred 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 fore-mentioned twenty miles by the proper proportion, it would give us thirteen 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.

It was in this vicinity that Meares stood in for an anchorage, (July 1788,) until he found bottom in ten 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 123° 58′. Upon passing close by it in 1857, we judged it to be not less than three thousand 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, while the hills inshore fall away. Like some other points on the Oregon coast, 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, behind which is the Nehalem River.

A few miles eastward of the cape is a very broken mountain.

Twenty-one miles, west by north three-quarters north, from the cape the Coast Survey chart gives a sounding of eighty-five fathoms over muddy bottom; and another of one hundred and thirty fathoms, same bottom, twenty-seven miles west half north from the cape.

From Cape Lookout to this headland a depth of twenty 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. In 1853 Davidson applied this name to the cape as far preferable to using 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 double-peaked mountain about three-quarters of a mile southward of it, is Ne-ah-kah-nie.

TILLAMOOK HEAD.

This prominent cape, in latitude 45° 58′, is twelve miles north-northwest from Cape Falcon, and nineteen miles southeast by south half south 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, eighty 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 two thousand five hundred 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, during a thick fog in 1853, we came almost upon it in the Coast Survey steamer; but inside of it lie several high rocks. From Columbia River Bar two rocks can be distinctly seen apparently off this head, 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.

From Cape Falcon to the large, rocky islet off Tillamook Head, the line of soundings increases regularly from sixteen to thirty fathoms; and thence to the south bar of Columbia River, they range from twenty-two to thirteen, and suddenly shoal, near the bar, to three fathoms. Eleven miles northwest by north one-third north from Tillamook Head, the Coast Survey chart has a sounding in sixty fathoms over sandy bottom; and seventeen miles southwest one-third west from the head there is a depth of eighty fathoms, over muddy bottom. From fifteen to eighteen miles west by south from Tillamook Head, La Pérouse got soundings in eighty fathoms over muddy bottom.

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 seventy 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 twelve hundred feet above the ocean occurs a stratum of white earth, then (1805–'6) used by the Indians as paint; and that the hillsides slip away in masses of fifty to one hundred acres at a time. Upon the top of the cape he found good, sound, solid trees growing to a height of two hundred and ten feet, with diameters of from eight to twelve feet. From Tillamook Head southward many miles was the country of the Killamuck Indians, then estimated to number a thousand people, and having fifty houses.

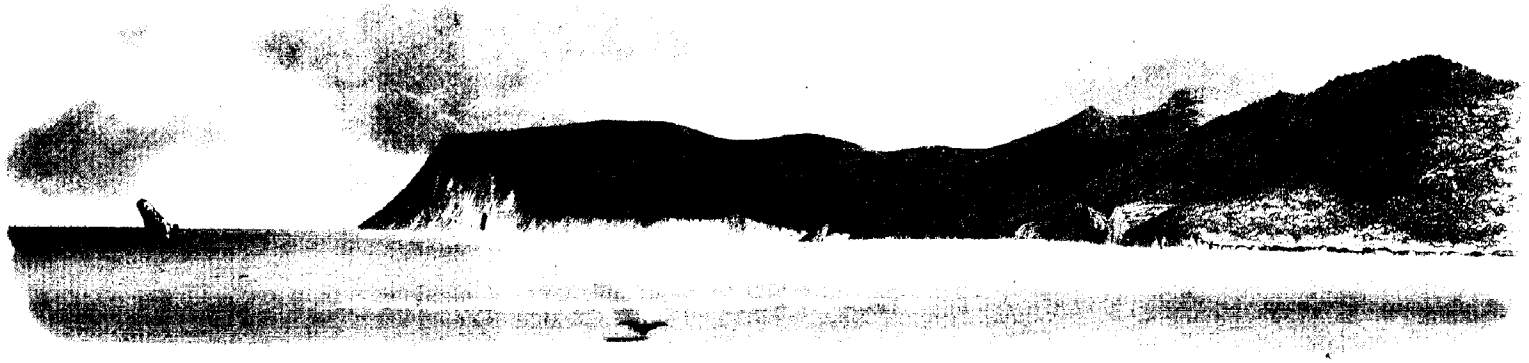
In latitude 45° 55′ La Pérouse speaks of a cape formed by a round-topped mountain, as the Cape Redondo of the Spaniards. It bore east 5° south, true, from his position. The Coast Survey chart has a mountain eight miles east-northeast from the head.

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 erroneously call this Cape Lookout.

The coast from Point Orford to Tillamook Head is well diversified by high



Tillamook Head N. by W. ½ W. (Compass) dist. 8 miles

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 one hundred miles northward, only broken by Cape Disappointment. The high mountains of the interior are, however, seen over this low shore.

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, while 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 eighty-five 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 flag-staff of Fort Stevens is:

	° ′ ″
Latitude	46 12 24.0 north.
Longitude	123 56 47.8 west.
	h. m. s.
Or, in time	8 15 47.2

This position is on the northeast part of the point, about half a mile from the ocean beach.

Fort Stevens is built on Point Adams.

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, southwest by south three and a quarter 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 Ponit Adams when the other cape was invisible; but if both lights were visible 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's 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.

* Perry's Japan.

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 Vancouver's "New Georgia," 1792.

This cape is the only headland that breaks the low line of shore from Tillamook to latitude 47° 20′. It presents a geological formation not before met with on the seaboard, being composed of horizontal columnar basalt rising to an elevation of two hundred and eighty-seven 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, and then slope slightly inshore to narrow ridges. They are destitute of trees, but are covered with grass, fern, and bushes. The soil is thin but excellent. Inshore of these 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 an ox-team road was opened by the Coast Survey to the summit of the cape. When the evening fogs from the northern bays do not cover the cape, a dense fog sometimes rolls down the river about sunrise, enveloping everything below the top of the cape, so that the summit appears like an islet in a sea of mist. The evening fogs have often been known to last for five weeks, without a single clear night.

From the southward, 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 projected upon the mountains inshore of it; but the slightest haze in the atmosphere brings it out in sharp relief. The isolated position of this headland, and the seaward face of its bold, treeless cliffs, form a peculiar feature of a long stretch of coast. As it is basaltic, and presents an almost iron front to 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 beach inside of the cape is a deposit of auriferous and ferruginous "black sand," the flakes of gold being small and very scarce. This black sand, by the iron contained in it, causes a local disturbance in the magnetic variation amounting to 26′.2; the variation being less by that amount than the declination found on the summit of the cape.

* United States exploring expedition, 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 ninety-five feet below the highest part. The tower is whitewashed, and being forty feet in height, and projected against a dark green background, shows well in daylight. The focal plane of the lens is one hundred and ninety-two feet above the mean level of the sea.

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 feet at a distance of 22½ miles.
30 feet at a distance of 23¾ miles.
60 feet at a distance of 26⅓ miles.

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 south-southeast to northwest one-quarter west, so that vessels coming from the northward cannot see the light until nearly in the latitude of the river. In July 1867, determined from sea the bearing of the light at night, when it was shut in by the higher part of the cape, to be southeast quarter east. 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, northwest by north half north, 62 miles.
Destruction Island, northwest by north, 84 miles.
Flattery Rocks, northwest five-sixths north, 118 miles.

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 DISAPPOINTMENT.

A fog-bell of sixteen hundred pounds has been placed on the bluff in advance of the light-tower, and is sounded during foggy or other thick weather, night and day. The machinery is on a level with the ground, in a frame building, whitewashed, and with the front open to receive the bell, which strikes nine consecutive blows each minute.

Entrance to Columbia River, Cape Disappointment E. by N. (Compass) dist. 10 miles

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 Orford to Cape Disappointment the extent of ocean shore-line is not less than two hundred and eighty-five 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 BARS AND ENTRANCE TO THE COLUMBIA RIVER.

The entrance to Columbia River is five miles wide between the nearest parts of Cape Disappointment and Point Adams, bearing north west by west one-quarter west, and southeast by east one-quarter east of each other. But the passage is greatly obstructed by shifting shoals, which lie two or three miles outside of the line joining the two points. The numerous surveys that have been made of this river at different times prove so conclusively the great changes constantly going on in the channels through the shoals, that no sailing directions that may be prepared can be relied upon for any great length of time. The best advice that can be given mariners is, *when up with the bar wait for a pilot.*

Up to October 1857, the mail and coast steamers entered by the south channel, parallel with and close to the beach south of Point Adams. But in that month this channel, which had been gradually narrowing as it approached Point Adams, suddenly closed, and remained closed until 1868, obliging vessels to use the north channel. But in the early part of 1868 it again opened, and had then more water upon the bar than the north channel, which in former times had the best depth. The north channel, although it gives a detour of some miles, has a straight channel over the bar, and from the unwearing nature of the cape does not change its position so much. Sailing vessels cannot beat into the south channel against the summer winds blowing from the northwest; so they are obliged to use the north channel. But they almost invariably come out through the former; as with the prevailing wind they can easily fetch out by the point of Clatsop Spit, and then have a fair wind over the bar.

During heavy weather, and especially in winter, the sea breaks with ter-

rific fury from northwest of Cape Disappointment, well to the southward of Point Adams. The mail steamers have sometimes to wait days for the smallest show of an opening to get in; and sailing vessels have laid off the entrance six weeks, waiting for a fair opportunity to enter. Many lie inside for weeks unable to get out. The mail steamers, by exerting all their power, sometimes drive through the combers, but have their decks 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 to be seen on the shoalest spots. 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. The mail steamers, to avoid delay, carry a bar pilot with them.

On the authority of the pilots, it is said that about June, during the season of freshets, fresh water can be taken up for the use of vessels on the bar.

When off the entrance, in fine, clear weather, the beautiful snowy peak of Mount St. Helens shows over the lowest part of the land inside, apparently in the middle of the river valley. (See view.) It is very regular in outline, and presents a pyramidal appearance, having a base equal to either side. It is over seventy-five miles to the eastward of the entrance to the river, and its height is estimated at thirteen thousand five hundred feet. It is volcanic, and occasionally discharges volumes of smoke.

The current.—Off Sandy Island, in the south channel, the strength of the ebb current was measured in 1851, and found to be nearly five and a half miles per hour.

The observations made by the Coast Survey in 1868, however, show a maximum velocity of only 3.4 miles in the same position. These observations were carefully made, and show the direction and velocity of the current during each quarter of the ebb and flood, from the bar to Astoria.

These observations show, first, that there is no slack-water at the change of tides from flood to ebb; secondly, that off the entrance to the north channel the maximum velocity of the flood is two miles per hour, and the set east-southeast; the maximum velocity of the ebb is 2.3 miles, and the set southwest by south half south, almost exactly in the direction of the axis of the channel. In the north channel, between the middle sands and the southwest point of the north breakers, the velocity of the flood was 2.5 miles, and its set east by south, or nearly across the channel. The velocity of the ebb was 2.7 miles, and its set southwest half west, directly down the channel. Off Cape Disappointment, between it and Sulphur Spit, (where Belcher grounded,) the under-current of the flood set north by east; and the surface ebb set southwest half south, with a velocity of 3.1 miles. About a mile to the eastward, however, with Cape Disappointment light-house bearing west-southwest, the velocity of the ebb increases to 4.4 miles per hour, setting west by south, exactly toward Cape Disappointment. There is here very

little flood-current. At the junction of the north and south channels, one mile east of Sand Island, the flood was east by south half south one and a half miles per hour; and the ebb, west half north, four miles per hour.

Off the south channel entrance, one and a half miles southeast of the south end of the middle sands, the ebb attains a velocity of two miles per hour, with a set at its maximum, south half west. The flood sets east-southeast, when it attains its greatest velocity, which is 1.3 miles. Off the northwest end of Clatsop Spit, flood, at its maximum, sets east by north half north, at the rate of 1.4 miles; and the ebb, southwest half west, three miles per hour. In mid-channel, southeast of the eastern end of Sand Island, the ebb attains a velocity of 3.4 miles, and sets west by south; while the flood at its maximum sets east half north, with a velocity of 1.9 miles. This is very nearly the same position where, in 1851, the velocity was found to be nearly five and a half miles.

The following table will show the set and velocity of the ebb and flood during each quarter, between the bar and Astoria. It will be found of great use to mariners.

Current Stations in Columbia River.

No.	Station.	1st quarter.		Maximum.		3d quarter.		Flood or Ebb.
		Set.	Drift.	Set.	Drift.	Set.	Drift.	
1	Off north channel entrance	E. by S. ½ S.	0.7	E. by S. ¼ S.	1.2	SE. by E.	1.1	Flood.
		S. ½ E.	1.4	SW. by S. ½ S.	2.3	SW. ½ W.	1.3	Ebb.
2	South channel entrance	E. ½ S.	0.8	E.SE.	1.3	SE. ½ E.	1.1	Flood.
		SE. by S.	1.5	S. ½ W.	1.9	S.SW.	1.2	Ebb.
3	Off Clatsop spit	SE. by E. ½ E.	0.7	E. by N. ½ N.	1.4	E.NE.	1.0	Flood.
		S. ½ W.	1.2	SW. ½ W.	3.0	SW. ½ S.	1.0	Ebb.
4	North channel, between North Breakers and Middle Sounds	N.NE.	1.7	E. by S.	2.5	SE. ½ E.	1.6	Flood.
		S.SW.	1.5	SW. ½ W.	2.7	W. by S. ½ S.	1.4	Ebb.
5	Between Sand Island and Point Adams	E.	1.1	E. ½ N.	1.9	SE. by S. ½ S.	0.8	Flood.
		SW. by S.	1.3	W. by S.	3.4	SW. by W.	1.5	Ebb.
6	East side of Cape Disappointment	.....	.....	N. by E.	.....	.....	.....	Flood.
		.....	.....	Under current.	.....	.....	.....	.....
		S. ½ W.	1.1	SW. ½ S.	3.1	SW. by S.	1.2	Ebb.
7	Between Sand Island and Cape Disappointment	.....	.....	SE. by E.	0.4	E.	.....	Flood.
		Under current.	.....	.....	.....	Under current.	.....	.....
		SW. ½ W.	1.5	W. by S.	4.4	W. by S. ½ S.	1.6	Ebb.
8	North of Sand Island	E.SE.	0.6	E.SE.	1.2	NE.	0.8	Flood.
		W.	1.1	W.NW.	2.7	NW. by W.	1.3	Ebb.
9	Between Scarboro' Hill and Sand Island	NE. by E. ½ E.	0.6	E. by S. ½ S.	1.5	SE. by S.	1.1	Flood.
		W.	1.5	W. ½ N.	4.0	W. by N.	2.3	Ebb.
10	Off Scarboro' Hill	E.by N.	1.2	E. by N.	1.8	E. by S.	1.0	Flood.
		W.	1.7	W. by S.	4.0	W. SW.	2.5	Ebb.
11	Off Fort Stevens	E.SE.	0.6	E.SE.	1.4	SE. by E.	1.3	Flood.
		W. ½ S.	1.2	W. by N.	3.2	W.	1.5	Ebb.
12	Off Tansey Point	E. by S.	0.8	E. by S. ½ S.	1.5	SE. by E.	0.9	Flood.
		NW. by W.	1.0	W.NW.	3.0	W. by N.	2.0	Ebb.
13	Off Skippermong Creek	E. by N.	1.5	E.NE.	2.0	E.NE.	0.7	Flood.
		W. ½ S.	1.7	W. by S.	3.0	W. by S.	1.6	Ebb.
14	Off Smith's Point	E. by N.	0.8	E. by N.	1.7	E.	0.9	Flood.
		W. by S. ½ S.	1.6	W.SW.	2.7	SW. by W.	1.5	Ebb.

The positions of the above stations are marked upon the Coast Survey chart of the river.

The general description of the channels in 1868 is found on pages 155 to 160, but the following disposition of the buoys for entering the south channel is given, because in 1869 no material change was reported except in one case, where the buoy will be replaced before this is published.

BUOYS FOR ENTERING COLUMBIA RIVER BY THE SOUTH CHANNEL.

No. 1.—Outer buoy, mammoth, first class, black and white vertical stripes, in twelve fathoms of water. Cape Disappointment light-house bears north by west half west. Point Adams bears northeast, distant four miles. Red buoy bears north, distant two and one-fourth miles.

No. 2.—Mammoth buoy, first class, red, off Clatsoff Spit, in five and one half fathoms water. Cape Disappointment light-house bears north-northwest three-quarters west; Point Adams bears east one-quarter north, distant three miles; west end of Sand Island bears north by east, distant one and three-fourths miles.

No. 3.—Inside, iron buoy, black, marking the western extremity of middle ground in three fathoms of water. Light-house bears west by north half north. Point Adams bears southwest half south, distance one mile. Sand Island bears west-northwest, distance three miles.

No. 4.—Iron buoy, black, marking north side of Tansey Point, in fifteen feet of water. Last buoy bears west by north half north, one and three-fourths miles; Scarborough Hill, north-northwest, three-fourths mile; Tansey Point, south by west, three-fourths mile.

No. 5.—Iron buoy, black, marking north side of channel, off Smith's Point, in fifteen feet of water; last buoy bears west half south, distant one and one-half miles; Smith's Point, bears east-southeast, distant one and one-fourth miles; Point Ellis, north by west one-quarter north.

No. 6.—Spar buoy, black, marking north side of channel abreast of Astoria in twelve feet of water. Astoria Point bears southwest three-quarters west. Point Ellis bears northwest by north. Distance from Flavel's Wharf one-third of a mile.

No. 7.—Spar buoy, white, marking a ledge of rocks above Astoria, in thirteen feet of water. Distance from last buoy, one-half mile. Distance from Flavel's Wharf, three-fourths mile.

Buoys in Woody Island, channel of Cathlamet Bay.

No. 8.—Spar buoy, white, in sixteen feet of water. Tongue Point bears southwest half south, distance one and one-fourth miles. Next white buoy (above) northeast three-quarters east, distant one mile.

No. 9.—Spar buoy, white, in sixteen feet of water. Tongue Point bears southwest. Burnside's House, southeast one-quarter south. Next buoy above, black, bears east by north three-quarters north, distant three-fourths mile.

No. 10.—Spar buoy, black, in twelve feet of water. Tongue Point bears south-

west half west; Burnside's House, southeast by south; next buoy above, white, northeast by east, three-fourths mile.

No. 11.—Spar buoy, white, in seventeen feet of water. Tongue Point bears southwest three-quarters west; Yellow Spot, north one-quarter east; next buoy above, white, northeast seven-eighths mile.

No. 12.—Spar buoy, white, in eighteen feet of water. Jim Crow's Point bears northeast one-quarter east; Yellow Spot, north by west one-quarter north; next buoy above, black, east by north one-quarter north, two miles.

No. 13.—Spar buoy, black, in three and one-half fathoms of water. Jim Crow's Point bears north-northeast; Rock Knoll, west by north half north.

TIDES OF THE COLUMBIA RIVER.

At Astoria the corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is 12*h.* 42*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 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 two tides is 1.4 feet for the high waters, and 2.3 feet for the low waters. When the moon's declination is greatest those differences are 1.9 feet 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 seven and a half 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.

The two tides of the same day are generally unequal in proportion to the moon's declination. The time and height can be obtained approximately from the following table:

Moon's declination.	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High water.		Low water.		High water.		Low water.	
	Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
	H. M.	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*
Greatest north	12 4	8.1	19 39	—0.4	13 16	6.5	18 38	2.5
Zero	12 5	7.5	19 14	0.8	12 5	7.5	19 14	0.8
Greatest south	13 16	6.5	18 38	2.5	12 4	8.1	19 39	—0.4

The interval is to be added to the time of the moon's meridian passage to give

the time of high or low water. The time of the moon's upper meridian passage is given in the Almanac, and the time of its lower meridian passage is the middle between two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest waters; to which level the soundings on the chart are given.

Spring tides.—At the full and change of the moon the high waters will be 0.8 foot higher than the above, and the low waters 0.5 foot lower.

Neap tides.—At the moon's first and last quarters the high waters will be 0.8 foot lower, and the low waters will not fall as low by 0.5 foot.

The tide on the bars of the north and south channels makes nearly fifty minutes earlier than at Astoria.

POINTS INSIDE OF COLUMBIA RIVER ENTRANCE.

Sand Island.—This island, the first met with after passing the bar, is about one and a quarter miles long, and is separated at high water into two parts. These two parts lie east-northeast and west-southwest of each other, and are about four hundred and thirty yards apart. They consist of loose sand raised a few feet above the river, and covered with trees, drift-logs, &c. From the western end of Sand Island a sand-bar, three-quarters of a mile long and bare at low water, extends in a west-southwest direction; and from the end of this bare spit the great Middle Sands make out, separating the north and south channels.

Chinook Point, on the northern side of the river, lies north by east two and three-quarters miles from Point Adams, and east quarter north four and three-quarters 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 eighty pounds in weight. We have purchased them weighing between fifty and sixty pounds, 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 Ellice, on the northern side of the river, is two and three-quarters 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 northeast, distant four and a third miles.

Behind Point Ellice 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 called 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, being named after Edward Ellice, then one of the directors of the Hudson Bay Company.

The Indian name is No-wehtl-kai-ilse.

Young's Point, 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 east three-quarters north, distant five and a third 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 Young's Point.

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	31.7	west.
	h.	*m.*	*s.*	
Or, in time	8	15	18.1.	

Tongue Point, on the southern side of the river, bears east-northeast eight and three-quarters miles from Point Adams, and northeast one-third east three and a half miles from Astor Point. It is a high, bold bluff covered with trees, and con-

nected 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.

Just above Astor Point is situated the town of Astoria, now a thriving commercial place. The custom-house is located here, and it is connected with Salem, the capital of the State, by a military road. Vessels bound up the river here exchange the "bar pilot" for a "river pilot." About the distance between Astor and Tongue Points lies the wreck of the ship Silver de Grace upon a dangerous rock, close in to which the channel goes, and around which the current runs with great velocity either way at half tide.

Cape Broughton is on the north side of the river, north-northwest three and a quarter miles from Tongue Point, and northeast one-quarter east five and three-quarters miles from Point Ellice.

It was named by Belcher in 1839, but was called Gray's Point by the United States exploring expedition.

On the Coast Survey charts it is called Cape Broughton.

The head between Point Ellice and Cape Broughton was named Chatham Head in 1839.

Gray's Bay lies to the northeast of Cape Broughton, and was named in 1792 in honor of Captain Gray.

Young's Bay lies between the eastern part of Clatsop Beach (called Tansey Point) and Young's Point. Into it empty Young's River, discovered, examined, and named by Broughton; Lewis and Clarke's Rivers, examined by them in 1805; and one or two small streams or slues.

Baker's Bay lies between Cape Disappointment and Chinook Point. It runs two and a half miles to the northward of the cape, and receives the waters of the small streams which head towards Shoalwater Bay, and is connected 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-chee.

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 Enseñada de Heceta.

In 1789 Meares called it "Deception Bay."

In 1792 it was named "Columbia River" by Gray.

Clarke says that, in 1805, the Indians knew it as the Shocatilum; and another name, obtained from another body of the natives, was Chockalillcum; 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 is not known. It was, perhaps, done by Vancouver or Broughton.

From Three-trees Point (or Cathlamet) the distance to the mouth of the Cowlitz is twenty-seven miles; to St. Helen's, sixty-five miles; to the mouth of the Willamette, sixty-three miles; to Vancouver, the military post, sixty-eight miles; and to Portland, the commercial capital, seventy-five miles.

It is reported that two feet less water can be taken over the "Swan Island bar," in the Willamette River, just below Portland, than can be taken through the Woody Island channel. Above Tongue Point a river pilot is absolutely necessary to all strangers.

CHANGES IN THE CHANNELS AT THE MOUTH OF THE RIVER.

The first reliable survey of the entrances to the river was made by Lieutenant Broughton, under the orders of Vancouver, in October 1792. His survey shows that but one channel existed; that its general direction across the bar was east by north three-quarters north, passing one and a half miles south of Cape Disappointment; that it was six miles long from the outer five-fathom line to a line joining the cape with Point Adams; that it was one and one half miles wide, and had not less than four fathoms in it; and that the Spit Bank (now called Chinook Spit) 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, five fathoms was the least water found. The deepest channel, after getting over the bar, was close under the north shore eastward of Chinook Point. A narrow channel was also developed between the river side of Point Adams and the shoal stretching from Cape Broughton towards it. It had three fathoms in it.

British Admiralty Survey in 1839. The next examination of the entrance to Columbia River was made by Sir Edward Belcher in 1839. His survey shows the following remarkable changes: Between Cape Disappointment and Post Adams a large middle bank had formed, (the present great middle sands,) and near the eastern end of this bank a sandy island appeared, (Sand Island,) with a bank one and a half miles long, extending to the westward from it, bare at low water, and full of snags and trees. Its northwestern point bore east-southeast, two and three-quarters miles from Cape Disappointment, stretching on this course one and a half miles further, so that its eastern end bore north half west, one and a third miles from Point Adams. Off this eastern end was found deep water. This great middle ground, covering an extent of four square miles within the three-fathom lines, occupied part of the track where Broughton, in 1792, found five fathoms. The Middle Bank and Sand Island divided the waters of the river, and thus two channels were formed. The bank on the southwestern face of Cape Disappointment (now called North Breakers) stretched one and a half miles to the southward of its old limits, and nearly across Broughton's only channel of 1792. A middle ground had formed to the eastward of Cape Disappointment, and off the entrance to Baker Bay, which separated what is now called the north channel from the channel into Baker Bay. On the northwest point of this shoal Bel-

cher found only six feet. In 1792 there was deep water all over the space occupied in 1839 by this middle ground. Spit Bank (now called Chinook Spit) had been cut away by the waters of Belcher Channel, (now called North Channel.) The western part of the shoal off Point Adams had been cut away to a distance of three miles, and a channel opened along the Clatsop beach and south shore, past Point St. George and Tongue Point.

Survey of the United States exploring expedition, 1841.—This survey shows but one opening to the ocean, with the inside north and south channels combining and passing through it. Since Belcher's survey, the south sands had stretched to the westward across the south channel as it existed in 1839, but the north channel was but little changed. It had several lumps with only four fathoms; its general direction was the same; it had at least a fathom more than the south channel, and retained its former shape and direction after passing inside the cape.

The shape and position of the middle sands were nearly the same, but its eastern point had moved nearly half a mile to the northwest, giving deep water where Belcher placed the eastern part of Sand Island, while the western islet occupied nearly the same position as formerly.

The western end of the great middle ground east of Point Adams had scarcely changed.

The course in over the bar and through Queen's or South Channel was straight for over six miles, until 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, one and one-half miles south by west from Cape Disappointment.

Surveys of the United States.—The first examination of Columbia River entrance by the United States Coast Survey was made in 1850. This survey shows the following changes since 1841.

The south sands, (now called Clatsop Spit,) which, in 1841, stretched six miles to the westward from Point Adams, had been cut through about midway between the point and their western extremity by a wide channel, with deep water, running south by west from Sand Island. But the bar of this channel was not fairly opened, there being less than three fathoms on it. This channel was, therefore, running at right angles to that of 1841, and over the spot marked bare in 1839.

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 1841, but was more contracted.

The Middle Bank (now called Middle Sands) was much changed, but its northern part was similar to that of the previous surveys. The eastern point had moved north-northwest three-quarters of a mile since 1841. Sand Island had much increased in size, and had apparently moved with it.

A long sand bank had made out from Point Adams in a northwest direction for over a mile. It was then, and is now, called Clatsop Spit.

The western end 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 made by the Coast Survey, and was founded on a complete triangulation and the topography of Point Adams, Sand Island, and Cape Disappointment. This survey developed the following changes.

The new south channel had been fully cut out, and the bar had moved three-quarters of a mile eastward, with a wider entrance and three feet more water.

The north channel had contracted to half its width at the bar, with its northern line upon the line of 1850. The depth was not quite so great, but there was still a fathom more water than on the South Bar. The channel was not so straight as in 1850, and a swash channel had formed southwest of the cape, across the North Sands, (now called North Breakers.)

The Spit Rock (Chinook Spit) of 1792 was being re-developed.

The Middle Bank (now called Middle Sands) had increased in size; and Sand Island had moved to the west-northwest over a quarter of a mile, giving eight fathoms of water where the beacon of 1850 stood. The bank, bare at low water, which extended to the westward from the island, had split into two forks, or spits. Compared with the surveys of 1839 and 1841, we find that one part of Sand Island retained the same position; but that a mile, stretching east by south half south, had been completely cut away, and was crossed by the south channel.

Clatsop Spit had changed its shape, trending more to the westward.

The western end of the great middle shoal east of Point Adams occupied the position given to it in 1839 and 1841.

Although no re-survey was made by the Coast Survey until 1868, it may be remarked that in 1857 the south bar was within less than a mile of the beach south of Point Adams, and the channel ran nearly parallel with and about three-quarters of a mile from the shore. The north channel was wide and straight. In October 1857 the south channel closed up entirely.

Survey of 1868.—This was the third examination made by the Coast Survey of the bars and entrances to the river, and has been executed in the most thorough manner, from a depth of fifteen fathoms outside the bars to Three-trees Point, about twenty-three miles above Cape Disappointment. This survey shows the following important changes:

First. The re-opening of the south channel with a fathom more water than can be found in the north channel. The new channel entrance is now over two miles wide between the south point of the Middle Sands, and the southwest side of Clatsop Spit, and has over four fathoms in it. Its course is first north-northwest for three and a half miles, until abreast of the northwest point of Clatsop Spit, when it turns and runs northeast by east half east, between Point Adams and

Sand Island, joining the north channel at a point whence Point Adams bears east-southeast.

The north channel is narrower, but holds pretty much the same position as in 1857. But only three and a half fathoms can be carried through it. In its narrowest part it is over six hundred yards wide between the three-fathom lines. Its course is northeast from the entrance to Peacock Spit, one and a quarter miles south half east from Disappointment light-house. It then runs due north one and one-eighth miles until abreast of Sulphur Spit, (where Belcher grounded,) which is southeast by east half east five-eighths of a mile from Disappointment light-house, and then turns northeast three-quarters east one and three-eighths miles; after which it skirts the northern side of Sand Island, and joins the south channel.

The North Breakers, formerly called the North Sands, extend from Cape Disappointment south-southwest two and three-eighths miles from the light-house. For one mile and three-quarters of this distance they had less than twelve feet of water, and for five-eighths of a mile they were dry at low water.

Sand Island was found to have separated into two parts: the easternmost part lying east-northeast and west-southwest three-quarters of a mile in length; the westernmost part lying north-northeast and south-southwest also three-quarters of a mile long. At low water both parts were joined, and the whole formed a bare sand-spit lying east-northeast and west-southwest two miles in length. From the west end of this sand-spit the Great Middle Sands extended first southwest two miles, with an average width of five-eighths of a mile, and then south-southeast for two miles and a quarter; the south point of the sands bearing south by east nearly five miles from Cape Disappointment light-house, and southwest by west four and a half miles from northern extremity of Point Adams. Clatsop Spit extended west one-quarter north from Point Adams to a distance of two and three-quarters miles, and was composed of several spits, bare at low water, which are surrounded by masses of breakers; the spit is two and a half miles wide, in a northeast and southwest direction, at a distance of one and a quarter miles from Point Adams; from its northwest point to the east end of the Middle Sands is exactly one mile between the lines of three fathoms; this is the narrowest part of the South Channel.

A swash-channel, with eight feet of water, which runs close to the northwest side of Point Adams, was found to have nearly cut across Clatsop Spit, from its north to south side, and no doubt by this time has been cut completely through; its direction is almost exactly north and south.

Spit Bar (now called Chinook Spit) has a general direction from Chinook Point west half north five and a half miles; and the line of three fathoms from Chinook Point runs first west half north for five miles, and then gradually turns to the south and west and forms the extreme point of the shoal nearly a half mile east three-quarters south from Cape Disappointment light-house; at this point the north channel is barely four hundred yards wide between the three-fathom lines; this is its narrowest part. Mid-way between Chinook Point and Cape Disappoint-

ment the spit is dry at low water for one mile and a quarter of its length, and in many other places the extreme low tides also leave it bare.

We find three distinct channels formed after we pass Sand Island; the first close under the north shore for about seven miles in an east-northeast direction, when it cuts across the Great Middle Bank in a southwest by south direction, and joins the mid-way channel about two miles west of Tongue Point; through this channel fifteen feet can be carried at mean low water, its shoalest part being where it crosses the Great Middle Bank. The mid-way channel occupies nearly the middle of the river; it runs from the point of junction of the north and south channels, east one-quarter south four miles, and then turns and runs about east by north half north, joining the south channel at Tongue Point; its narrowest part is north-northwest of Smith's Point, where it is only one-eighth of a mile wide between the three-fathom lines. This channel cuts across the Great Middle Bank in an east by north direction, about one and three-quarters of a mile from its western end, and over three fathoms of water may be carried through it at mean low water.

The south channel skirts the north side of Point Adams, running first in an east by south half south direction five miles to Tongue Bar, when it turns about and runs east-northeast across the mouth of Young's Bay, and close to Smith's Point to Astoria. From Astoria the channel, although somewhat crooked, has a general direction northeast to Tongue Point, still keeping close to the south shore of the river; at Tongue Point it joins the other two channels. At Tongue Point the channel again divides into three parts, the most northern of which runs to the northeast and then to the eastward, and joins the channel under the north shore at Rocky Knoll. Thirteen feet may be carried through this channel to Rocky Knoll; but extensive flats, across which only seven feet at low water can be carried, separate it from the Woody Island Channel.

The middle fork, called the Woody Island Channel, has a general course about northeast by east from Tongue Point, about three and three-quarters miles, where it again divides into two channels, which are separated by a mass of sand, bare at low water.

The north fork is called Rocky Knoll Channel. The south fork retains the general name, "Woody Island Channel." The general course of Woody Island Channel, from the point where Rocky Knoll Channel joins it, is about northeast to Woody Island, five miles; and then the channels all uniting in one, hug the north shore of the river to Three-trees Point.

Thus we see that the survey of 1868 shows an immense middle bank, beginning three-quarters of a mile to the west of Woody Island and extending to within three-quarters of a mile of Point Adams, a distance of nearly sixteen miles; but that this great extent of shoal water is cut up by many slues and channels, the main ones of which beginning from the west are—First, the north channel, which, after skirting the north shore, passed Chinook Point and Point Ellice, cuts across the Great Middle Banks, six miles from its west end. Second, the mid-way channel, which cuts across the bank about three and a half miles to the west of

north channel, and one and a half miles from the west end of the bank. Third, the north fork of the channel at Tongue Point, which cuts across the bank first in a northeast and then in an east direction, when it joins the channel out of Gray's Bay, and both together form a broad and deep channel, which, skirting the north shore of the river, separates the north side of the bank from the shore, and joins the great main channel at the east end of the bank, three-quarters of a mile to the west of Jim Crow Point. Fourth, the north fork of the Woody Island Channel, called Rocky Knoll Channel, which cuts across the south side of the bank in an east and west direction, and separates from the main body of the bank a mass of sand two miles long, and a half mile wide, a large portion of which is bare at low water.

It may be here remarked that the Great Middle Bank, through a great portion of its length, is full of dry sand flats, some of which are of great extent, being over two and a half miles in length.

These are the main changes developed by the survey of 1868.

SAILING DIRECTIONS.

To enter by the South Channel.—Bring Cape Disappointment light-house to bear north by west one-quarter west, and steer for it. This course will bring you to the Outer Bar buoy, which is placed in twelve fathoms, one and one-eighth miles southeast by south from the southern point of the Middle Sands. When up with this buoy, which you may pass close to on either hand, steer north for three and a quarter miles to the red buoy on the west end of Clatsop Spit. Give this buoy a berth to starboard of one hundred and fifty yards, and when abreast of it steer northeast by north until the Fort Stevens flag-staff on Point Adams bears east-southeast. Then steer east one-quarter north until the same flag-staff bears southeast by south three-quarters south, when steer southeast one-quarter east until the flag-staff bears southwest three-quarters west. Now steer east three-quarters south, two and three-eighths miles, until you bring Point Ellice to bear north, when you will see a black buoy three-quarters of a mile northeast three-quarters east of you. Now you must steer northeast by east three-quarters east to Astoria, where you may come to anchor off Astor Point in from seven to eight fathoms; or, by rounding the point to the front of the town, you may anchor in from four to six fathoms in the bight. But if bound up the river, the best direction that can be given is to take a pilot at Astoria.

To enter Midway Channel.—When, on your east one-quarter north course in South Channel, Fort Stevens flag-staff bears southeast by south three-quarters south, steer northeast by east half east, three-quarters of a mile, until the same flag-staff bears south one-quarter west, when you must steer east for two and three-quarters miles until the west end of Smith's Point bears southeast one-quarter east. Now steer east by north half north, three miles, until Cape Broughton bears north three-quarters east. Then steer northeast by east half east to Tongue Point. Here you must take a pilot.

To enter by the North Channel.—Bring Cape Disappointment light-house to bear north by east three-quarters east, and steer for it until you are in three and a half fathoms hard sand, and about two and a half miles from the cape. You will then be about midway between the Middle Sands on the east and the North Breakers on the west, and must steer northeast one and one-third miles to the black buoy off Peacock Spit; which leave on the port hand one hundred and fifty yards, and steer north by east one-third east, one and one-eighth miles, for the black buoy off the southwest end of Chinook Spit. When within three-eighths of a mile of this buoy, and exactly abreast of the red buoy on Sulphur Spit, steer northeast three-quarters east, for the second black buoy on Chinook Spit, which leave on the port hand two hundred yards off. Now steer east by south, four and a half miles, until the priest's house on Chinook Point bears north-northeast, when you may steer northeast by east half east, until Tongue's Point bears east by south, when you may cross the Great Middle Bank into midway channel by steering southeast by east, two miles, until Tongue Point bears east by north three-quarters north. Now steer northeast by east half east, and pass Tongue Point, after which you must take a pilot.

But if bound to Astoria, stop your east by south course when Fort Stevens flag-staff bears southeast by south three-quarters south, and steer for it until the priest's house on Chinook Point bears northeast one-quarter east, when you will be in eight fathoms, and must steer southeast one-quarter east, and follow the directions given for the south channel.

All strangers should take a river pilot at Astoria or Tongue Point.

SHOALWATER BAY.

The bold cliffs of Cape Disappointment, after extending about three miles northward, change suddenly to a low, broad, sandy beach, running north by west half west, eighteen 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 determined 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 northwest by north two-thirds north, five and a half 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; but 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.

Seven miles southwest three-quarters west, Tebenkoff gives soundings in sixteen fathoms, and a line of soundings of same depth along the coast to a position southwest three-quarters west, ten miles from Point Hanson.

The point was named Cape Shoalwater, and placed approximately in latitude 46° 47′ by Meares, in July 1788. In 1792, Vancouver assigned to it 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 sometimes 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 forty-one and a half feet above the ground, and about eighty-seven 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 first 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 was discontinued September 1, 1859, and relighted in the early part of July 1861.

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 ten 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 southeast of Point Adams.

In 1855 there were 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 had four fathoms of water upon it, was a mile wide, and lay two miles off the beach south of Leadbetter Point, with the northernmost trees bearing northeast by east. Running in on this line a vessel shoaled her water from ten fathoms three miles off shore, to four fathoms two miles off; then gradually deepened it to five fathoms, when she hauled close up under the point of breakers northward of her, and about half a mile distant; ran along in from six to seven fathoms until abreast of the low grassy point, when the course of the channel was north by west half west for one and one-half miles, with from eight to ten fathoms, hard bottom, its outline being well marked by the breakers outside. From thence a course northeast by north for two miles led to eighteen fathoms, and over a mile inside the line joining Leadbetter Point and Cape Shoalwater, the western trees on Leadbetter Point bearing south one-half east, three and three-quarters miles distant. When the tide was low, sand-bars and flats showed 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 bore south, distant four miles. The greater body of water passed through this channel, and the current ran very strong. In summer, with a northwester blowing, it was a dead beat after passing the bar, and in some places the channel was less than half a mile wide between the three-fathom lines. Coasters did not enter it except with a southerly wind, and always

picked out the channel from aloft. In summer they had a leading wind out, and started on the first of the ebb.

The bar at the north channel had about three and a quarter fathoms upon it, and bore southwest by south one-quarter south, three miles from the southern extremity of Cape Shoalwater. It was about a mile in extent within the three-fathom line.

In making the bay from the southward in summer the directions were to 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 four and a half and four fathoms, when the southern side of the elevated ground of the cape bore northeast by north half north. Then head up as near that course as possible, crossing the bar in three and a quarter 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 five to seven fathoms, hard bottom, and increase the depth to twelve well inside the point, when its southern extremity should bear northwest half west, distant one and a half miles. If it was low water sand-banks showed in different directions, and the channels were tolerably well marked thereby.

The invariable practice of vessels entering was 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. There are buoys to mark the channels, but their positions are properly changed by the light-house authorities to suit the changes of the channels, so that no directions can be given about them.

The north bar bore northwest by north two-thirds north from the south bar, distant five miles.

The Middle Sands lay between the two channels. The southern tail was southwest one and three-quarters miles from Leadbetter Point, ran northwest by north two-thirds north for two and one-quarter miles, then north-northeast two and a quarter miles, and east-northeast one and a half miles, with an average width of one and a quarter miles. One mile outside of it soundings are found in seven 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 of the bay stretching southward toward Baker's Bay is fifteen miles long from Leadbetter Point, with an average width of not less than three and one-half miles, whilst the upper portion stretches to the northeast 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 north-east 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 northeast half east 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 slues running through them.

The Násal enters about eleven miles south from the Palux, and abreast of the middle of Long Island. It has over twenty 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 one and one-half miles wide at high tide.

There are three islands in the bay. Pine Island, about one and a half miles northwest by north 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 north-northeast 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 southeast for six miles, and has an average width of one and a half miles. It is covered with a dense forest of fir and undergrowth. One mile south-southeast 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.

Northeast three-quarters north, distant six miles from Leadbetter Point, is a sharp, narrow cliff, sixty 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.

This bay was discovered, but not entered, by Lieutenant John Meares July 5, 1788, in the Felice, when proceeding in search of the Rio de San Roque of Heceta.

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 thirteen and a half miles, and the hard ocean sand-beach furnishes an excellent road that can be traveled 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.

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 northwest by west one-quarter west one and five-eighths miles from Point Hanson; its length is one and three-fourths miles, and direction northwest half west, 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 south by west three-eighths west for one and three-quarters miles, 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 sixteen fathoms. In June 1867, the channel thence ran nearly southwest for two and three-quarters miles to the bar, which had twenty-five feet of water, and lay west by south one-quarter south three and a half miles from the Fort Chehalis flag-staff, half a mile south of the extremity of Point Hanson, and southwest half south two and three-quarters miles from the south point of Eld Island. At that time the channel was straight and marked by buoys. The buoy outside the bar was in thirty-nine feet of water, and the first one inside the bar in thirty feet of water, bearing northeast half east one and a quarter miles from the former. The eighteen-fathom line was half a mile southward of the line of buoys and parallel with it. The outer buoy was west by south three-quarters south, three and seven-eighths miles from Fort Chehalis flag-staff. The course inside these buoys was northeast half east to the narrowest part of the channel, passing a buoy on the port hand about half a mile south of

Eld Island, in eighteen feet of water. Inside Eld Island a fourth buoy, in eighteen feet of water, marked the southeast part of shoal off the island, and one and a quarter miles east by north half north from this buoy was a fifth buoy on the edge of the south shoals, in eighteen feet water. But the positions of the buoys marking the entrance are changed by the light-house authorities to correspond to the changes of the bar and channel.

It is unsafe to attempt entering this bay without a pilot.

The secondary astronomical station of the United States Coast Survey is on the extremity of the fast land of Point Hanson, within ten feet of the marsh. From it the geographical position of Fort Chehalis flag-staff has been determined, as follows:

	° ′ ″	
Latitude	46 53 43.7	north.
Longitude	124 06 53.8	west.
	h. *m.* *s.*	
Or, in time	8 16 27.6	

The computed magnetic variation for December 1862, is 20° 53′ east, with an increase of 1′ annually.

Ten miles southwest three-quarters west from Point Hanson Tebenkoff gives soundings in sixteen fathoms, and has a line of soundings of the same depth down the coast to a position seven miles southwest three-quarters west from Cape Shoalwater. Seventeen miles west from Point Hanson he has a sounding in forty-three fathoms.

Tides.—The corrected establishment or mean interval between the time of the moon's transit and the time of high water is 12*h.* 12*m.*, and the difference between the greatest and least intervals is 1*h.* 52*m.* The mean rise and fall of tides is approximately 5.8 feet. The average difference in height of the morning and afternoon tides of the same day is 1.5 feet for high water and 2.7 feet for low water; and when the moon's declination is greatest these figures are, respectively, 2.2 feet and 4.1 feet. The average difference in height between the higher high and lower low tides of the same day is 8.0 feet; and when the moon's declination is greatest, 9.0 feet.

The higher high tide in twenty-four hours occurs about 11*h.* 39*m.* after the moon's upper transit, (southing,) when the declination is north, and about 47*m.* before that transit when the declination is south. The lowest low water occurs about seven hours after the highest high water.

The following accounts of the different examinations of the Gray's Harbor entrance exhibit the marked changes which it has undergone:

At the time of Whidbey's survey, under the orders of Vancouver, in 1792, a bar existed off the entrance, having the following position: From Point Hanson, southwest by west half west, three and a half miles distant, and from Point Brown, southwest by south one-quarter south, 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 four to ten fathoms in it until nearly abreast of the points, where it was contracted to half a mile, and the depth increased to fourteen 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 northeast one-quarter north for three and a quarter miles to between the points, with two low sand islands in range on the course, and six and a half 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 it 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 one and three-quarters miles long by half a mile wide in the middle of the entrance, and connected by a shoal with Point Brown, while the channel ran between the island and the southern point. The bar bore southwest two and a quarter miles from Point Brown, and west two and a half miles from Point Hanson, with a depth of about three fathoms. This position shows that the bar had moved north by east 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 work being probably stopped by the breakers.

In 1860 the surveying brig Fauntleroy, drawing ten feet of water, lay 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 being 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 two and a half 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 channel was not straight, but the seaward end curved to the northward of west. The bar had sixteen feet of water upon it, and was five hundred and fifty yards across between the outer and inner three-fathom lines. From Fort Chehalis flag-staff it bore west three-quarters north, distant four and a third miles; from the south end of Eld Island west by

south one-eighth south, distant two and three-quarters miles; from Point Brown, seen over Eld Island, southwest half west; and from Point Hanson, directly west.

In 1860, while the United States surveying vessel was lying off the bar, a current running to the northward, at the rate of one and a half mile per hour, was distinctly noticed. Immediately off the harbor this current strikes the ebb current of the bay, and deflects the mass of water to the northward. With the flood current the mass of water sets over the south sands. It is estimated that the offshore 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 three and a half 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 south 71° west, distant three-quarters of a mile, and anchor in the channel in three and a half 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 four and a half miles long; its general direction is southeast by south. The bay shore is covered with fir. The outer is the shore commencement of a sand waste, stretching towards the Copalis River. Between the timber and this waste is a large pond or lagoon, and outside of that the sand is covered with coarse beach grass and stunted lupin bushes, and cut up with the tracks of bears, cougars, wolves, elk, &c. 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.

From Point Hanson the mouth of the Chehalis River bears northeast five-eighths east, distant twelve 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 northeast by east, and distant five and a half 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 north 39° east, distant four and three-quarters 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 south 43° east, distant four and a quarter miles.

To the north-northwest 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 twenty-two 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 four and a half square miles. This will give a fair idea of the extent of the harbor. Through the flats lying between this available space and the Chehalis run two channels. The northern commences at a point two miles east-northeast from Point Brown, is the only available one, and would require buoying 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 is in 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.

In August 1864 the United States Indian agent reported the discovery of gold at Chehalis Point.

The *Chehalis River* has been navigated by a small steamboat for twenty 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.

* Named by the United States exploring expedition, 1841.
† Named by Whidbey in 1792.

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 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 store-ship Dædalus, October 1792, under the direction 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 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 125th degree 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 traveling along the shore.

From Point Brown the shore-line trends about north-northwest 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 one hundred 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 sixty 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 southeast by east 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 the general experience.

Off the coast of Washington Territory, La Pérouse says "the currents on this part of the coast are extremely violent; we fell in with eddies which did not suffer the ship to obey her helm with a three-knot gale, five leagues from land."

POINT GRENVILLE.

From the Copalis to this point the shore runs northwest half north about sixteen 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. The three-fathom curve extends 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 seventy-five feet high, lie east by south, four hundred yards distant; another lies southwest three-quarters south, 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.

N.W. (Compass) 10 miles Sail Rock Pt. Grenville

Destruction I. N.W. (Compass) 6 miles

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 northwest by north half north, distant sixty-two miles, and from the cape soundings may be had in from eight to fifteen fathoms, three or four miles from the shore.

West by north, distant sixteen miles from Point Grenville, we discovered, in June 1855, a bank having fifteen fathoms upon it, with very soft mud bottom; at twenty-one miles distance, seventeen fathoms; and at twenty-nine miles, thirty-six fathoms; and three miles south-southeast of the first position we struck sixteen and a half fathoms, with the same bottom, in all the soundings; but had not time to make an extended examination. In April 1856 we found forty-five fathoms in latitude 46° 54′ north, longitude 125° 03′ west, being sixteen miles broad off shore. The soundings of seventeen, eighteen, and nineteen fathoms, one mile from shore, would indicate a greater depth than we obtained. Vancouver has fifty fathoms inside of our first soundings.

Twenty miles southwest of Point Grenville, Tebenkoff has a current running to the northwest.

This point is said to be the Punta de Martires of Hece 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 eight thousand one hundred and thirty-eight feet, according to determinations made in 1841 by the United States exploring expedition, which placed it in latitude 47° 45′ north, and longitude 122° 37 west.

It is said to have been first seen by Perez, in 1774, who placed it in 47° 47′ north, 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 his supposing it much nearer the coast-line than it actually is, upon the bearing which he observed. In his sketch it is marked quite close to the shore, in latitude 47° 14′ north. 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′ north.

QUÉ-NI-ŪTL RIVER.

The mouth of this small stream is between three and four miles northwest by west 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 Que-nait′-sath. The Mukkaws call it the Quin-aitl. De Mofras calls it "Kiniat."—(See remarks, Destruction Island.) On the Coast Survey reconnaissance chart it is called Quie-nite-l River.

These Indians, when traveling 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 skillfully handled.

For four miles above the Queniutl, the coast trends in the same direction, northwest by west, is composed of sandstone cliffs, and bounded by many precipitous rocks, the height and direction of which are generally that of the cliff; the outer one, about fifty yards in extent and thirty feet high, is split in two, as seen from the westward, and has been named the Split Rock. In the Coast Survey reconnaissance of 1852, one is placed two and a half miles off shore in latitude 47° 27′, and the vessel's track is laid down inside of it. It is a low black rock about twenty yards in extent and twelve feet above water; there is plenty of water one-quarter of a mile outside of it. From the number of sea lions upon it it has been named Sea Lion Rock. 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 quite flat on the top, which has an elevation of seventy-five feet,

covered with a very dense growth of bushes, which have been removed in a few places by the Hooch Indians for the raising of potatoes. There is upon it a clump of four trees, readily distinguished when a few miles from it. Vancouver reported a few dwarf trees upon each end in 1792. The shores are bold, rocky, perpendicular, and nearly of the same elevation as the bluffs of the main shore. It is said that there are some remarkable perforations through a rock near it, but these are, doubtless, only seen in particular directions. On the eastern end were formerly some rude Indian huts.

In running along this coast when ten miles off, it is very difficult to make out this island. It is of the same elevation as the coast cliffs adjacent, and when projected against them cannot be distinguished from them except when a slight haziness exists between the island and main.

It is two and seven-eighths miles from the nearest part of the main shore, which here runs straight north 30° west for ten miles. Its general direction is north-northeast and south-southwest, having an extreme length of nearly half a mile, and its width is about three hundred yards at the widest part, near the southern end. Towards the north it tapers to a small round point, from which projects a gravelly tongue about two hundred yards long, curving to the northwest. Just beyond this tongue is a ledge sweeping to the westward one-third of a mile, with a few detached rocks awash outside. Off the northern end of the island and ledge a number of large detached rocks, with three and five fathoms between them, extends in the general direction of the island, nearly a mile from the edge of the bluff. Heavy breakers generally exist throughout this rocky patch. The western approaches to the island present a very rocky, uneven bottom, entirely unfitted for anchorage except at such a distance that the island would afford no protection from southerly winds or seas. The ten-fathom line is within three-eighths of a mile of the western shore, with uniform hard bottom outside that distance in eleven and twelve fathoms; and very irregular depths inside it, with two sunken rocks having thirteen and eighteen feet of water on them. About two hundred and twenty yards south of the extremity of the reef at the south end of the island, and a quarter of a mile from the island, there is a sunken rock with sixteen feet of water upon it. The southeastern face of the island is free of sunken rocks, but has broken, irregular bottom. South of the line of kelp (which commences off the northeastern part of the island and runs along the eastern face of the detached rocks to the northward,) there are five and six fathoms very close to the shore. Sandy, sticky, and uniform bottom in ten fathoms is found off the southeast face of the island, at a distance of one-eighth of a mile from shore; and the water appears to deepen only a fathom in a quarter of a mile. Between the northern end of the reef and the shore to the north-northeast the depth of water is everywhere less than eight fathoms: the soundings are very uniform, between nine and ten fathoms to North Rock, one hundred feet high, four and a quarter miles north-northeast of the north end of the island, and one mile from the nearest shore. Seven miles south of Destruction Island, in latitude 47° 33½′, Vancouver anchored in

twenty-one fathoms of water over soft, sandy, and muddy bottom. This position placed him seven miles from the nearest shore.

The examinations of the Coast Survey have materially reduced the reported size of this island. The extent of the island and reefs is one and three-eighths miles north-northeast by half a mile in width; and a thorough reconnaissance has developed the fact that it affords no protection against southeast weather; in fact, proximity to the island at such times is dangerous.

The approximate geographical position of the north end is:

	°	″	
Latitude	47	41	north.
Longitude	124	25	west.

From Cape Disappointment it bears northwest by north eighty-four miles.

The average rise and fall of the tides observed at Destruction Island is about five feet.

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 twenty-one fathoms, seven miles south of this island, he "had calms, and found a constant current, without intermission, setting in the line of the coast to the northward at a uniform rate of half a league per hour." After passing Cape Orford he had been regularly thus affected, and carried to the north ten to twelve miles per day further than was expected. He gives the latitude of the island as 47° 37′ north.

The United States Coast Survey published in 1866 a hydrographic reconnaissance of Destruction Island and its relation to the main land.

In the indentation of the coast five miles north of Destruction Island empties a small stream named the Hooch, after the Hooch Indians living upon its banks; about three miles northward of this stream is an island smaller and higher, but similar in outline to Destruction. Although close to shore, yet in hazy weather it is seen standing out apparently a long distance.

From Destruction Island northward the shore is composed of cliffs, which form a regular curve to a point bearing northwest half west from the north end of the island, and eleven miles distant; thence the shore runs nearly straight on that course for ten 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′, both approximately. Many others, but smaller, lie inside of them, and nineteen fathoms are found close outside. Along this stretch the shore is irregular and bluff, with many high rocky islets off it. About fifteen miles from Destruction Island, off the mouth of a stream laid down as the Quil-ley-ute, there are two large, rocky islets covered with trees, showing a cave in the sea-face of the southern and larger one. They are not far

Flattery Rocks N.W. by N. (Compass) 5 miles White Rock

from the low beach, and behind the larger one is a stockaded village on a green rise between the beach and timber. Behind the northern and smaller one enters a small stream from the north and east, with apparently low ground to the south and east. About three miles northward of these rocks is Table Rock, about seventy feet high, and one or two miles off shore. It has very steep sides, regular and grassy top, which rises into a slight, round mound in the middle about ten feet high; the positions of the rocks, and their relation to the coast in this vicinity, are only approximate.

Meares calls the curve of the coast, about Destruction Island, "Queenhythe Bay," evidently a corruption of the Que-ni-utl, or Qué-noith.

FLATTERY ROCKS.

From the two rocks just mentioned to Cape Flattery, in 48° 23′, the course is almost north-northwest, passing through a group of high, well-marked, rocky islets, in latitude 48° 12′ north, 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 mainland.

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 Survey steamer is laid down inside of it, with sounding in nine to twenty fathoms. High, abrupt, timbered islets lie inside, with their ocean faces nearly perpendicular, about one hundred and fifty feet high, and sloping landward. Where destitute of trees, these are covered with grass, bushes, &c. There is a large stockaded Indian village at the foot of the high grassy slope abreast of the Flattery Rocks. There must be protection for the Indians to land their canoes. 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′ north. On recent English admiralty charts the cape is placed in the position of the Flattery Rocks, although Vancouver adapted 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 north three-quarters east, (true,) distant six or seven leagues, while the coast extended from north to southeast, (true,) and the nearest shore distant about four leagues. 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 north three-quarters east, (true;) the extremity of Cape Flattery bearing

nearly north, (true;) the distance to the nearest point of land a little more than three leagues, and the coast northward of Point Grenville bearing southeast, (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 southwest, 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 east-northeast and finally north, behind the mountain constituting Cape Flattery, to within two hundred yards of the beach in Neé-ah Bay. A rise of twenty or thirty feet of the sea would make Cape Flattery an island, extending five miles (west-northwest) 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 two thousand feet high, densely covered by 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 four 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 west-northwest 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 one hundred and eight 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 one hundred and fifty 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 west-northwest, 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

Duncan's Rock
Lt.Ho.
Tatoosh I. North (Compass) 3 miles
Cape Flattery

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 one hundred and forty feet high and fifty feet in diameter, is seen to the southeastward, close under the face of the cape. It shows well when approaching Tatoosh Island from the west, and is last seen from the Strait of Fuca, when the cape is just open with the east end of Tatoosh Island. It is named Pinnacle Rock; sometimes called Fuca's Pillar, but Juan de Fuca located his pinnacle on the north side of the entrance to his mythical straits.

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 sixty-six 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 one hundred and sixty-two 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 south of Alaska.

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 a little verdure, and surrounded by breakers in every direction." They also "saw a very remarkable rock that wore the appear-

ance 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 surly 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 Muk-kaws originally came from the west coast of Vancouver Island.

Here we may be permitted to remark, that from this place to Cape Lookout, the descriptions of Meares are confirmed by the later observations of the Coast Survey.

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 north 33° west, distant two thousand and seventy-eight yards, or more than a mile, and many vessels pass between them, as the chart shows twenty-five 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′ north, 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.

DUNTZ 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 one hundred feet high, much disintegrated by the wearing action of the ocean; rises in a mile to an irregular hill of fifteen hundred or two thousand 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 sixty-eight 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 one hundred and forty-eight 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 longitude. 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 in relation to this matter—Flattery Rocks.) In 1852 we found that the then head chief of the Muk-kaws, a powerful man, about forty or forty-five 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 Japanse 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 especially the influence of the great Japan Warm Stream that crosses the Pacific, and reaches the American coast about latitude 55°, where it divides, the greater part flowing down the coast of British Columbia, Washington, Oregon, and California, and the smaller branch sweeping close along the northwest shores.

BANK OFF CAPE FLATTERY.

At the entrance to the Strait of Juan de Fuca, fifteen miles, by estimation, west-northwest from Cape Flattery, it is reported that a bank exists, having eighteen fathoms upon it. The Indians frequently go out upon some bank off the strait to fish for cod each season. In July 1865 the schooner Brant, of Victoria, discovered cod-fishing banks off Cape Flattery, and caught five barrels of cod after two hours' fishing. The fish are known as red cod, and weigh from five to fifteen pounds each. The bank has soundings in twenty-five fathoms, and is sixteen

miles nearly due west from Cape Flattery. In 1867 an examination was made of halibut banks in fifty fathoms water, off the southwest coast of Vancouver. This is an Indian fishing ground. Canoes go out on ebb current, catch an average of fifty fish of forty pounds weight each, of indifferent quality, and return with flood current and westerly wind. No extended examination was made.

About latitude 48° 35′, and seventy-five miles west by south from Tatoosh Island, La Pérouse sounded over a bank having thirty-five fathoms and pebbly bottom. On a line about twenty miles north by east from that point he got forty-two, forty-five, sixty-five, seventy-five, and thirty-four fathoms; thence southeast he increased his depth to ninety fathoms in about seven miles. The weather foggy, and no observations for position. This is, doubtless, the bank lying thirty-five to forty-five miles west from Cape Flattery, and making out from Barclay Sound. The English Chart No. 1917 exhibits this bank to which I have applied the name La Pérouse.

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 twelve miles, and the bearing from Tatoosh Island to Cape Bonilla north 18° west. From this line the strait runs east for forty miles, with a uniform width of eleven miles. It gradually contracts to eight miles, between Beechy Head on the north and Striped Peak on the south; changes its direction to east by north half north for fifteen miles; then expands to the northward, attaining a width of eighteen to twenty 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 eighty-four miles. The depth of water throughout the strait is remarkably great, no bottom being found in its deepest parts with one hundred and fifty fathoms of line. It is the main artery for the waters of Admiralty Inlet, Puget 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 one hundred and twenty miles, with an average width of twenty. Its currents run with an average velocity of not less than three miles per hour, and off the Race Island and Beechy 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 five thousand or six thousand feet. These are covered with spruce nearly to their summits. On the south, for thirty miles from the entrance, the shore is bounded by hills two thousand feet in height, backed by the jagged Olympus range of eight thousand two hundred feet. For the next fifty miles the shore is generally a

steep cliff, from fifty to two hundred 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 two hundred and fifty 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 fifteen thousand feet high.

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 a while, 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 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, forty-four 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 Sound and Admiralty Inlet along the strait westward, and are destined to meet those coming up the coast from Gray 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.

*Named by Vancouver, 1792.

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 twelve or fourteen leagues broad. From the mast-head it was observed to stretch to the east by north, 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 one hundred fathoms of line." He afterwards sent a party to explore the strait, who went up about fifty 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 fifty miles in an east-southeast 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 east by north two-thirds north from the light-house on Tatoosh Island. From Cape Flattery the shore is nearly straight, high, and rugged, backed by hills about one thousand five hundred or two thousand 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 twenty 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 south-southeast, and the same in width at the entrance. The western side is high, precipitous, and bordered by craggy, outcropping rocks, three hundred or four hundred yards from the shore. The three-fathom line ranges about six hundred yards from the foot of the bluff. The general direction of this side is southeast for one mile; when the hills suddenly cease, and a low shore, with sand beach backed by woods, curves gradually to the northeast by east 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 one and a half mile from Koitlah, east by north half north. This island

is a narrow, high ridge, about two hundred and fifty yards wide, and half a mile long, covered with trees, and having a direction southeast one-quarter east, 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 five hundred yards wide. Off the southwest part rocks extend for two hundred and fifty yards, and the three-fathom line is six hundred yards distant. Along the sand beach the three-fathom line is within two hundred 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 four hundred yards east of the small stream before referred to. From the northwest end of Waaddah Island it bears south by west half west, distant one and three-eighths 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 we left 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.

The buildings of the Indian reservation are near the Coast Survey station; the residence of the United States agent is at the eastern point of the bay.

Tides.—The corrected establishment, or mean interval between the time of the moon's transit and the time of high water, is 12*h.* 33*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 feet 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 nine 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 in 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 three hundred or four hundred warriors, mostly armed with muskets and knives. They had several large stockaded villages, and hundreds of canoes. We have counted over seventy 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 seven thousand five hundred 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 one hundred and fifty 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, and has probably been confounded for the O'Koho, thirteen miles eastward of Neé-ah Bay.

CALLAM BAY.*

From the eastern point of Neé-ah bay to Sekou Point,* the western part of Callam Bay, the course is east half south, and distance thirteen and a half 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 twenty 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 one thousand feet high and seven miles long. The western extremity lies east one-third south from Waaddah Island, is distant sixteen 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 east by north half north. Outside these limits fifteen 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 thirty-five 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 sixty-eight 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 east half south from the north end of Waaddah Island, and distant twenty-three miles. Its latitude is 48° 13′ north. The peak is slightly separated from the main ridge by a depression. From this point the shore trends south-southeast about a mile, and receives a stream coming from the westward, called Canel 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 east by north, and distant seventeen 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 eleven or twelve miles from Pillar Point, Low Point* makes out, at the mouth of a

* Name on the English admiralty chart, 1847.

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 ten 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 east by north 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 Angeles Point, at the mouth of the river Elwha, and the line joining the two runs east by north two-thirds north three miles across. Inside of this line the depth of the curve is about one and a quarter miles, with water ranging from sixteen fathoms to four or five close inshore. The western shore of the bay is bluff, the eastern low, with a bluff in the rear. The waters of the Elwha bring down such quantities of earth that we find only ten fathoms water at a distance of three-quarters of a mile off its mouth.

FORT 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 east-northeast direction for three miles, to the point called Ediz Hook;‡ which lies one and a half mile off the main shore, thus forming an excellent and extensive harbor, open to the eastward; with deep water of twenty-five to thirty 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 fifteen 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 twenty-five fathoms. In the indentation between Angeles Point and the head of the bay the water is shoal, ten 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 has been deemed necessary to mark it with a light-house. In thick, hazy weather, it would be readily distinguished if clumps of trees were planted upon it; as we recommended, in 1852, for the low tongue of New Dungeness. From the middle of the strait it cannot be

* Name on the English admiralty chart, 1847. The Indian name of this river is Kwa-ha-mish.
† Name on the English admiralty chart, 1847.
‡ Named on the English admiralty chart of 1847; E-ediz on that of 1859.

seen; and its position is ascertained by the light-house building, or the peculiarities of the bluff beyond.

LIGHT-HOUSE ON EDIZ HOOK, PORT ANGELES.

The light-house is within fifty-five yards of the eastern extremity of the Hook, and sixty-seven yards from the inner beach. The structure consists of the keeper's dwelling of one and a half stories, painted white, from which rises the tower, also painted white, with the dome red. The height of the focal plane is forty-two feet above the sea. The light is a *fixed white light* of the fifth order of Fresnel. It was first exhibited April 2, 1865, and is shown from sunset to sunrise. In ordinary states of the atmosphere, it should be seen from a height of—

10 feet at a distance of 11.0 miles.

20 feet at a distance of 12.5 miles.

30 feet at a distance of 13.7 miles.

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

	°	′	″	
Latitude	48	07	27.8	north.
Longitude	123	23	42.0	west.
	h.	*m.*	*s.*	
Or, in time	8	13	34.8	

The computed magnetic variation for January 1868, is 21° 30′ east.

From this light we have the following bearings and distances:

Light-house on Race Rocks, northwest three-quarters west, ten and a half miles.

Light-house at entrance to Esquimalt Harbor, northwest by north quarter north, seventeen and a half miles.

Light-house on New Dungeness, northeast by east, twelve and a half miles.

It is visible from a ship's deck, abreast of the Race Rocks. At the head of the harbor, and connected therewith by a small outlet, is a large salt-water lagoon. Fresh water is found on the south shore in several places, but the extensive flats render it difficult to be obtained. The bluff, about seventy feet high, comes almost directly to the high-water line, except in a few localities. There 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 grave-yard 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 northeast by east, distant two and five-eighths miles.

* The tribes now generally, but erroneously, known by this name call themselves the Nūs-klai-yam; they occupy the American side of the strait from the Oke-ho, thirteen miles from Neé-ah Bay. Their congeners are the T'sŏk and Sūgh-us on part of the Vancouver side.

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 who did not know the proper name of the harbor. The United States custom-house for this district was removed from Port Townshend in 1862, and located on the south side of this harbor, in the mouth of the sharp gully, nearly two miles south-southwest from the point of Ediz Hook. On the 16th of December 1863, the village and custom-house were destroyed by a torrent of water bursting through the gully behind the town; an accumulation of fallen timber that had dammed up the waters, having suddenly given way. The custom-house was again removed to Port Townshend; and the village is now located on the low, narrow point under the bluff, or little more than one and a half miles south three-quarters west from the light-house. The large Indian village is nearly one and a half miles south by east half east from the light-house. The head of the bay affords a capital beach for heaving down a vessel. 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 Angeles 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 north-northeast direction for three and seven-eighths 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 one and one-third miles southward toward 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, sixty 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 twenty fathoms are found about 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 north by east half east half a mile distant, when ten fathoms are found one-third of a mile broad off the beach. With the light-house bearing northwest by north three quarters of a mile distant, the same depth and bottom are found. The nearest shore will bear south one and a quarter miles, 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 set, and only saw her mistake and danger when the black hull of our vessel attracted her attention.

A shoal, with two and a half 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 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 ninety-two feet, and its elevation above the mean sea-level one hundred 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	

Computed magnetic variation, 21° 43′ east, in August, 1856, with a yearly increase of 1′.

From it we have the following bearings and distances:

Ediz Hook light-house, southwest by west, twelve and a half miles.

Race Rocks light-house, west, distant eighteen miles.

Esquimalt Harbor light-house, northwest by west seven-eighths west, twenty miles.

---

* *Buoy off New Dungeness Spit.* Another buoy has been placed off this point. It is an iron buoy of the second class, painted red. It lies in three and a half fathoms water, one mile northeast by north from New Dungeness light-house, and west by north one-half north from the southern end of Protection Island.

Victoria Harbor, northwest by west three-quarters west, distant seventeen and three-quarters miles.

Smith's Island light-house, northeast by north one-quarter north, distant thirteen and a half miles.

Point Wilson, east by north, distant fourteen and three-quarters miles.

Admiralty Head light-house, west by south half south, seventeen and two-thirds miles.

FOG-BELL AT NEW DUNGENESS.

Upon the outer extremity of the point a fog-bell of eleven hundred pounds weight has been placed, and is said to be struck by machinery, five blows, at intervals of ten seconds, followed by a pause of ten seconds. In 1867 the machinery was out of order, and the bell was struck by hand, during foggy or other thick weather, day and night. "The striking machinery is in a frame building, painted black, with the front open to receive the bell, and raised thirty feet above the ground, on an open structure, whitewashed."

Tides.—The approximated corrected establishment is *3h. 3m.*, and the approximated 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.

In 1856 the United States Coast Survey published a topographical and hydrographic chart of New Dungeness.

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 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 northeast 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 six and a half miles northwest, on account of the outward curving of the intermediate shore. Inside of the harbor we found seventeen fathoms. Its width is a little over a mile, and regular; its length about three miles, and the general direction southeast by south. One mile outside of the sand-spit a depth of ten and twelve fathoms exists, deepening rapidly to thirty and thirty-five, with a bottom of stiff mud.

This harbor was surveyed first by the United States exploring expedition,

and called Budd Harbor; but there being a sheet of water in Puget Sound bearing a similar name, we have adopted Kellet'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 east two-thirds south, distant seven and a half miles from Dungeness light-house, and extends one and three-quarters miles northeast half east, being narrow, curved outward to the strait, and having a low point at each end, with shoal water stretching from the western end. Its sides are very steep, and about two hundred feet high, the seaward part covered with timber, and that towards Port Discovery undulating and covered with fern. It lies two miles directly off (northwest) 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 extends north-northwest 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 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 east by south one-fifth south, 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 northeast one-quarter east one and a half miles from Challam Point, and is a steep bluff, rising directly from the water. The average width of the bay is nearly one and three-quarters miles 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: One and three-quarters miles south, four miles east by south two-thirds south, two and a half miles south by east, and one and three-quarters miles southwest by south. 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 south-western part of the bay, and reaches a height of twenty-one hundred 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 than twenty-five fathoms in any place, and in some forty fathoms. Under the second low point on the east we could not find less than twenty-five fathoms a few ship's lengths from the beach, but found good anchorage in twenty fathoms, soft bottom, on the western shore, two miles south-southeast 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, and a regular lumber trade carried on.

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, were refitted in this bay.

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 a great number 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.

This is the western point of the entrance to Admiralty Inlet. From Dungeness light it bears east by north, distant nearly fifteen 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 two or three hundred 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 fifteen 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 twenty fathoms can be found 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

* Named by the United States Coast Survey in 1855.

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.

In 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 designated it as above.

For the description of Admiralty Inlet, Puget Sound, and adjacent waters, see under the proper headings.

VANCOUVER ISLAND.

This island was 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 JUAN DE FUCA.

From Point Bonilla to Owen Point, forming the western head of the entrance to Port San Juan, the shore runs thirteen miles east one-third north. It is nearly straight, rocky, and bluff, with high mountains rising immediately behind it, and all heavily wooded. From ten to twenty fathoms are found within half a mile of the shore. Vessels are apt to lose much of the wind when close under either shore, but the strongest currents run on the American side, as a forty-fathom bank stretches out from Point Bonilla nearly half way across the strait, while more than one hundred fathoms are found towards Tatoosh. Point Bonilla was named Point Duffin, by Meares, after his first officer, who explored this coast.

PORT SAN JUAN.

The eastern head of entrance to this harbor is formed by several large rocks, called Observatory Rocks on the admiralty chart of 1847. From Tatoosh Island light they bear northeast by north quarter north fourteen miles distant. The width of the bay is one and two-thirds miles from point to point, and their bearing east quarter south, and west quarter north from each other. The length of the bay is three and a half miles on a general course northeast three-quarters north, and the width almost uniform at one and a quarter miles to the very head, where several streams enter, among which are Cooper Inlet at the northeast, and the river Gordon at the north, where stands a large Indian village called Onismah.*

* Name on the English admiralty chart, 1847.

Across the entrance a depth of ten fathoms is found, except near Observatory Rocks,* close to which seventeen fathoms are found. Outside we find from fifteen to twenty, and 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. In very clear weather it is difficult to distinguish the entrance at a distance, 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. 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* twenty-three and a half 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 fifty and sixty fathoms. From Sheringham Point, on an east half north course to Otter Point* the distance is four and a half 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 Beechey Head* the distance is eleven and a half miles, and the course east one-quarter north. 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 northeast for half a mile across the entrance. To the eastward of this spit is the passage, only one or two hundred yards wide, with an irregular and rocky bottom, and some sunken rocks. The currents run 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 northeast. 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 Van-

* Name on the English admiralty chart, 1847.

couver 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 Beechey Head the water is very deep, and the currents go by with a rush. In this vicinity a United States revenue-cutter touched the bold shore with her flying jib-boom, and struck only her forefoot after the jib-boom had been carried away.

The approximate geographical position of Beechey 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 Beechey 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 twenty fathoms, and with from seven to ten fathoms beyond the eastern one. The eastern head is formed by Cape Church.* This bay is inclosed by high, rocky hills.

RACE ROCKS.

From Beechey Head the outermost of these rocky islets bears east by north, 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 covered with grass, but are without trees or bushes. Stretching southeast 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 Massey log. This is a bad place for sailing vessels when the airs are light. The Race Channel lies between the Race Rocks and Bentinck Island, and is nearly half a mile wide. See remarks in the directions for Esquimalt and Victoria Harbors from the Race Rocks.

LIGHT-HOUSE ON RACE ROCKS.

The tower on the Great Race has an elevation of one hundred and eighteen feet above high water, and since the first day of October 1864, has been painted in alternate broad horizontal bands of black and white.

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 Jan-

* Name on the English admiralty chart, 1847.

uary 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 geographical position of the light as determined by the United States Coast Survey is:

	° ′ ″
Latitude	48 17 59.5 north.
Longitude	123 31 23.0 west.
	h. m. s.
Or, in time	8 14 01.5.

Computed magnetic variation 22° 04′ east in 1861.

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 eight and a half miles.

Entrance of Victoria Harbor, north by east half east, nine miles.

Trial Islands, northeast by north, ten and a half miles.

Discovery Island, northeast by north, fifteen miles.

Smith's Island light, northeast by east three-quarters east, twenty-six and a half miles.

New Dungeness light, east eighteen miles.

Ediz Hook light, southeast three-quarters east, ten and a half 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 forty to fifty fathoms deep, and the general set towards 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 twelve miles. On nearing it, vessels should round it at a distance of not less than from half a mile to a mile. The outermost danger is a rocky patch of five feet, lying southeast by east, nearly half a mile from the tower.

On rounding the Rocks Esquimalt Harbor fixed white light will be seen, and should be steered for on a bearing north half west, which will lead clear of the reef extending a short distance off Albert Head. Keep the bright white 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 an account of the currents, which, during spring tides, run as much as six knots in the neighborhood of the

* Name on the English admiralty chart, 1847.

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 north by west, when she will have ten fathoms, with good holding 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.

In entering Esquimalt Harbor, the light should be left from three to four hundred yards on the port hand, and when it bears south by west a ship may anchor in seven fathoms, or stand into Constance Cove, (Village Bay.) When the light bears northwest by west it changes from bright white 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 white, which is the mark for clearing Brotchy Ledge off Victoria, and Scrogy Rocks off Esquimalt. When the light changes from red to bright white it leads clear of the Scrogy Rocks about one hundred and twenty yards.

The course for the entrance to Victoria Harbor, after rounding the Race light, is north three-quarters east; and when Esquimalt light changes from bright white to red, a vessel will be one mile from the shore in thirty-three 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.

The light-house 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 fifty-seven 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 white light*, visible through an arc of 220° of the horizon. Through 20° it exhibits a green light, through 58° a bright white light, and through 142° a red light. It will show *green* when bearing between north by east two-thirds east and north one-quarter west, *white* from north one-quarter west to northwest by west one-third west, and *red* towards the harbor, or from northwest by west one-third west to south-southeast.

It is placed at an elevation of seventy 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.

Esquimalt Harbor is where all the British men-of-war lie, and contains a small naval dock-yard, called Royal Bay.* The entrance is a quarter of a mile wide, and has two rocky heads on either hand, the western head having Fisgard† Island off it, and the eastern having outlying sunken rocks south of it, with several islets. From the entrance the general direction of the bay is north-northwest, 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 ten to thirteen 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 Nanaimo (Nahny′moh) coal mines.

VICTORIA HARBOR.

The entrance to this harbor is two and a quarter miles east of Esquimalt. As the channel is very contracted, crooked, and obstructed with a ten-feet bar, vessels usually anchor outside in ten or fifteen fathoms, taking care to avoid Brotchy Ledge,* with only seven feet of water upon it, lying about half a mile south-south-east of the eastern head, and southwest three-quarters west 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 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 ten to twenty fathoms are found inside of it. The shores adjacent are low, but rocky and covered in part with trees, reminding one of the rocky parts of the coast of Massachusetts and Maine.

The United States Coast Survey established an astronomical station on the

*Name on the English admiralty chart, 1847.
†English charts of 1851 call it Fishguard.

narrow neck known as Laurel Point, at the south side of the inner part of the entrance to the harbor. The geographical position of this station is:

	° ′ ″
Latitude	48 25 30.6
Longitude	123 20 38.7
	h. m. s.
Or, in time	8 13 22.6

The town of Victoria has grown very rapidly since the development of the gold-fields on Frazer River, and regular steamers ply between Victoria and the Columbia River, ports on Puget Sound, and towns on Frazer River.

TRIAL ISLANDS.

These islands lie four miles east-southeast from the entrance of Victoria Harbor, with a rocky, irregular, and moderately low shore. The islands are small in extent and about eighty feet high; the currents set by them with great velocity.

DISCOVERY AND CHATHAM ISLANDS.

The former of these two islands lies two and a half miles off the southeast point of Vancouver Island. It is about a mile in extent, two hundred and thirty 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, which are about thirty feet high. Close around the western side of Discovery and Chatham is a channel, having from seven to seventeen fathoms, but it is only fit for small craft. From the western part of Chatham to Cadborough Point the distance is about three-quarters of a mile. Numerous rocks show close to the point.

The United States Coast Survey have a trigonometrical station on the summit of Discovery Island. Its geographical position is:

	° ′ ″
Latitude	48 25 36.4
Longitude	123 13 06.5
	h. m. s.
Or, in time	8 10 52.4

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.

SMITH'S ISLAND.

The only island lying broadly in the Strait of Fuca is Smith's Island, near the eastern termination of the strait, 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 fifty-five 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.

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 one and a half miles, and has a width of a mile. In sailing through this field we found the depth of water very uniform at six and a half 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 ten to five fathoms, and on the south side, east of the kelp, in from ten to eight 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 shore.

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 forty-one and a half feet above the surface of the ground, and about ninety 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.

---

* Named by the United States Coast Survey in 1854.

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

	° ′ ″
Latitude	48 19 11.0 north.
Longitude	122 50 11.1 west.
	h. m. s.
Or, in time	8 11 20.7

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 sixteen and a half miles.

From Race Island light, northeast by east three-quarters east twenty-six and a half miles.

From New Dungeness light, northeast by north thirteen and two-thirds miles.

From Point Wilson, northwest half north eleven miles.

From southwest point of the entrance to Rosario Strait, south half east six and two-thirds 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 either.

BANKS AND FIELDS OF KELP IN STRAIT OF FUCA.

Partridge Bank.—Three miles south half east of Smith's Island, is the northwestern point of 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 east-southeast for two miles, with ten and twelve fathoms upon it. It is on the prolongation of the shore line from Admiralty Head to Point Partridge, and without doubt a part of the shoal stretching five miles west three-quarters north from that point. Inside the kelp it is generally known as a ten-fathom bank, with muddy bottom. We have run across it with these soundings, but recent partial examinations show spots with five and nine 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.

Hein Bank.—Bearing west half south 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 five fathoms, with hard, sandy bottom.

Recent partial examinations show that this field marks the northeast part of the bank lying nearly north and south, with a length of four miles, and a breadth of one and a half mile within the limits of the twenty-fathom line, and that the least water found among the kelp is three and a half fathoms, where Blunt's Island light bears about east five-eighths north and New Dungeness about south by east quarter east.

We named this bank in 1854.

In the English Admiralty Chart No. 1917, published in 1865, it is called Fonte Bank.

The field laid down on the admiralty chart of 1847—nearly on this course, and four miles from Smith's Island, having only two fathoms marked upon it—has been sought for, but not found, it is not laid down on the British Admiralty Chart No. 1911, with corrections to 1865.

Salmon Bank.—One mile south of the southeastern point of San Juan Island, and eight and a half miles northwest by west one-quarter west 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 six feet of water within its limits. Recent examinations show that this is connected by a four-fathom bank with the southeast end of San Juan Island, and stretches south-southeast therefrom for two and a half miles, with a breadth of three-quarters of a mile within the limit of the ten-fathom line.

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.

Middle Bank.—East by north five and a half miles from Discovery Island, and south by west one-third west four and a half miles from the Hudson Bay Company's settlement on San Juan Island, is an eleven-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 bank is about two and a half square miles within the limits of the twenty-fathom line.

Constance Bank.—Northeast half north seven and a half miles from Race Rocks, and southeast by south four miles from the entrance to Victoria Harbor, are a couple of spots showing nine and thirteen fathoms.

ARCHIPELAGO DE HARO IN WASHINGTON SOUND.

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.

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 northeast and seven miles distant. Starting from this line, and about three miles from Discovery, a course northwest by north for sixteen 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 northeast half east for eleven miles; finally, north-northwest two and a half 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 *San Juan Island* on the eastward, and pass it at the distance of one and a half miles. Its mountains rise to one thousand and seventy 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 one hundred and fifty 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 five and a half miles northwest by west one-quarter west from Discovery Island; then stretches westward for two miles, and gradually curves to the north-northwest, 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 six hundred and ninety feet. Fresh water is obtainable on the southern shores of the bay. The northern limit of the bay is *Darcy Island*,§ north one-quarter west four miles from Gordon Head, and on this course, and one and three-quarters miles 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 north-

* Named San Juan on English admiralty charts of 1847 and 1859; Bellevue by the Hudson Bay Company; Rodgers by the United States exploring expedition, 1841.

† English admiralty chart, 1847. On that of 1859 Cordova Bay is called Cormorant Bay.

‡ From the name of the Indian tribe in this vicinity. Admiralty chart, 1847.

§ Admiralty chart, 1847.

northwest of it. A mile and a quarter west of it is a sunken rock. In the bay a depth of not over twenty fathoms is found, decreasing irregularly in advancing, but in the southern portion affording capital holding in ten fathoms. A mile and a half east-southeast from Gordon Head are patches of kelp and foul bottom.

When eight and a half miles within the entrance the width of the strait decreases to three and a quarter miles, having Darcy Island (low and wooded) on the west, with a small islet off its northeast 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*.* It lies east by south five-eighths south from the southeast 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 Survey brig Fauntleroy beat through the field, the existence of this danger was unknown.

Since this discovery several rocks, covering a space of half a mile square, on the same bearing from the southeast 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 one hundred and fifty-five fathoms is found.

The island to the eastward, nearly abreast of Darcy, with a small cove at its southern end, is *Henry Island*† 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*‡ one and a half miles northward of Darcy, with the Dot Rocks between them, but near 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, ten miles from the entrance, is two and three-quarter 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 Island, and between them and the latter is good anchorage, and capital fishing ground for halibut. The island near the canal is named Halibut Island.* 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 Nanaimo 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, fifteen miles from the entrance, is *Stuart Island*,† and the canal is here contracted to a breadth of only two miles, this being the narrowest part. Two and one-eighth miles west-southwest 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 five to twenty fathoms. One mile northwest of Stuart Island a depth of one hundred and ninety fathoms is found.

Stuart Island, in many places, is very high and precipitous, and covered with

* Named by the United States Coast Survey, 1854.
† Named by the United States exploring expedition, 1841.
‡ The name on the English admiralty chart, 1847.

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 northeast half east for eleven miles, having on the northwest side *Saturna Island*, which rises into mountains. *Java Head*,* near its eastern extremity, stands up perpendicularly nearly seven hundred 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*.‡ The western one is about one mile from Waldron, moderately high, and wooded; the eastern is smaller, about forty 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 northwest by west three-quarters west, two miles distant, the west end of *Patos Island*§ will bear north-northeast two and a half miles, and the west end of the *Sucia Group*‖ east-northeast three and a half miles; the course outlying north-northwest, between Patos and East Point, which are two and three-fourths miles apart. Seven miles on this course carries you to the middle of the Gulf of Georgia. Close off East Point is found a depth of one hundred and twenty fathoms, and off Patos Island one hundred and seventy 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 Bank¶ lies southwest by west seven-eighths west one mile from the southwest 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, as determined by the United States Coast Survey, will serve to check the courses above given:

* Named by the United States exploring expedition in 1841. On the English admiralty chart of 1859 it is called Monarch Head.

† Named by the United States exploring expedition, 1841.

‡ So called by the United States exploring expedition in 1841. Named Wooded Island and Bare Island by United States Coast Survey in 1853.

§ Old Spanish name. Called Gourd Island by the United States exploring expedition, 1841.

‖ Old Spanish name. Sucia signifies muddy. The harbor on the east has a soft muddy bottom. The United States exploring expedition called them the Percival Group, 1841. The Indian name is Choo-sá-nung.

¶ Discovered and named by the United States Coast Survey, 1858. Called Plumper Reef on English admiralty chart, 1859.

Coast Survey station, on the summit of Discovery Island, latitude 48° 25′ 36″.4 north; longitude 123° 13′ 26″.5 west.

West point of Stuart Island, latitude 48° 41′ 17″.5 north, longitude 123° 14′, 29″.6 west.

West point of Patos Island, latitude 48° 47′ 03″, longitude 122° 57′ 31″.2 west.

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 positions of the islands are shown on sketches issued from the Coast Survey office in 1854 and 1858.

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 north by east, distant seven miles from Blunt's Island, and is four and a quarter miles wide. The western point of the entrance is formed by a point running out from *Watmough Head*,* which is four hundred and fifty feet high, and on the southeast part of *Lopez Island*.† Off this point lie several rocky islets, with deep water among them and a rushing current. The outer one, named Southwest Island,‡ is about fifty feet high, rocky, flat-topped, destitute of bush or tree, narrow, and about one-third of a mile in length, east and west. East five-eighths south from it, at a distance of half a mile, lies *Davidson 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.

The whole southern face of Lopez Island is guarded by rocks and reefs. The island itself is very rocky and moderately low. On part of its southern bluff we discovered, in 1854, deep marks of glacial action.

---

* Named Watmough Head by the United States exploring expedition in 1841. On the first sheets of the United States Coast Survey called Walmough Head. On the English admiralty chart of 1859 called Walmouth Hill. The Indian name is Noo-chaad-kwun.

† Vancouver determined it to be an island in 1792. In 1841 the United States exploring expedition named it Chauncey's Island. English admiralty chart of 1847 has it Lopez Island; and it is always known by this name on the coast.

‡ Named by the United States Coast Survey in 1854.

§ Named on the English admiralty chart of 1859.

On the eastern side of the entrance is a small wooded island called Deception Island, at the mouth of *Deception Pass*, an intricate and very narrow three-fathom channel, three miles long, running between the north end of Widbey Island and the south end of *Fidalgo Island*.* In 1841 the United States brig Bainbridge 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, and is known by no other on this coast.

In the middle of the entrance to Rosario Strait Vancouver anchored in thirty-seven fathoms, black, muddy bottom, in 1792.

When at the entrance, and one and a half miles from the western side, a line passes clear of everything from one end of the strait to the other. This course is north by west half west, and the distance nineteen and a half 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 have the following: Northwest by north two-thirds north for eleven and one-fourth miles; north by east three-quarters east for three and three-fourths miles; and northwest half west for six and a half miles—making a total of twenty-one and a half 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,† 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 Sound*‡ can be seen. This bend is called *Shoal Bight*,§ and has from six to ten fathoms for a mile out, with level sandy bottom. In mid-channel rise the *Bird Rocks*,‖ about forty 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*.‖ 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,† and the entrance the Lopez Pass.† Several large islands are found inside. Vancouver's boats evidently were in this bay, as his chart gives a good general

* Named by Eliza in 1791. Called Perry's Island by the United States exploring expedition in 1841.

† Named by the United States Coast Survey in 1854. Lopez Pass is called Maury Pass on the English admiralty chart, 1859.

‡ Called the Macedonian Crescent by the United States exploring expedition in 1841; named Lopez Bay by the United States Coast Survey in 1854.

§ Named by the United States 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.

‖ Named by the United States exploring expedition in 1841.

idea of it. The anchorage of Shoal Bight continues some distance northward of this opening, and abreast of some moderately high white bluffs. North-northeast three-quarters of a mile from Bird Rocks lies *Belle Rock*, directly in mid-channel, making a very dangerous position. It shows four 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 twenty feet square. We discovered and named this danger in 1854, and while erecting a signal upon it noticed that the tide rose nearly one and a half foot while the current was yet running ebb at the rate of three miles an hour. Between it and the Bird Rocks there is a submarine ridge with plenty of water, but marked by strong eddies when the surface is smooth. 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 the *Williamson Rocks*,* a cluster of rocky islets about forty feet high, with deep water close around them. From Deception Island they bear northwest two-thirds west three miles distant, and from Southwest Island, off Watmough Head, northeast five miles. Half a mile northward of them is *Allan Island*,* which is about three-quarters of a mile in extent, and about two hundred feet high, with its southern face partly bare. A quarter of a mile off its southwest 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 *Burrow's Island*,* one and a half miles long southeast and northwest, by half a mile in breadth. The island is between six and seven hundred feet high, and has a notably flat top, is wooded, and may be seen from the Strait of Fuca. At the eastern end of the 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 three and a half miles; but it is soon contracted by *James Island*,* on the western side, and opens into a channel running north-northeast, called the *Bellingham Channel*,† which is about two miles wide at its entrance. A small channel, called Guemes 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 one thousand two hundred and fifty feet, covered with woods, and presenting a flat appearance from certain directions. James Island consists of two heads a mile apart, and two

† Named by the United States Coast Sur ey, 1854. The Indian name is Tut-segh.
Named by the United States exploring expedition, 1841.

hundred and fifty 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.

Northwest of James Island is an opening on the west between Decatur Island and Blakely Island,* with twenty-five fathoms in it, but with a rock, covered at a quarter flood, exactly in the middle of the entrance. It is called Thatcher Pass. On the east, half a mile up the strait, appears the southwest point of *Cypress Island*,† off which lie rocks and foul bottom for half a mile on a line to Burrow'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 one and one-quarter 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 six to ten 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,§ to an elevation of one thousand five hundred and twenty-five 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 one and a half mile, where the bold rocky face of Blakely Island rises to a height of between nine hundred and one thousand feet. The greatest elevation of the northern part of the island is one thousand and forty-four feet.‖

Nearly half a mile southeast from its east face lies a very small low rock called *Black Rock*,§ and half way between it and the south end of the island is a *white rock*,§ a quarter of a mile from the shore. In this narrow part of the strait the depth of water is about sixty fathoms, and the current goes through with a roar like the sound of a gale of wind through a forest. When at anchor in ten fathoms, under the low point one and a half 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,* 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.

---

* Named by the United States exploring expedition, 1841.

† Named by Vancouver, 1792.

‡ Named by Vancouver, 1792. The Indian name for Strawberry Bay is Tutl-ke-teh-nas.

§ Named by the United States Coast Survey, 1854.

‖ The English Admiralty Chart No. 1911 has this erroneously copied at two thousand and forty-four feet.

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 seven hundred and fifty feet. It is called Bald Peak.* Abreast of it the channel takes the first turn, changing its course to north by east three-quarters east for three and three-quarters miles. Half a mile off the north end of Cypress Island is a small islet covered with trees, and called Cypress Rock.† Northwest of it are some sunken rocks, but their exact position is not accurately known. The comparatively low island half a mile north-northeast of Cypress is *Sinclair Island*,‡ 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,§ 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 east by south three-quarters south, distant five hundred yards. From the western point of the island the reef bears exactly north, distant three-quarters of a mile. The revenue cutter Jefferson Davis and the steamship Panamá have been upon it since it was discovered in 1854. On the north side of the island is anchorage in ten to fifteen fathoms, half a mile off shore.

Three miles from Sinclair Island lies *Orcas Island*, on the northwest side of the strait. It is a large island, with a mountain named Entrance Mountain, one thousand one hundred and twenty 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 one and a half miles 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 one thousand five hundred and sixty feet. The rock nearly one hundred 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 twenty-five feet high, with plenty of water around them.

Abreast of Point Lawrence the channel is over three miles wide, and it there changes to northwest half west for six and a half miles, to a line joining the

---

*Named by the United States Coast Survey in 1854. The Indian name is Sheh-ung-tlh, signifying the home of the Thunderbird.

†Named by the United States Coast Survey, 1854.

‡Laid down by Galiano and Valdes as Isla de Ignaso. Received its present name from the United States exploring expedition in 1841.

§Discovered and named by the United States Coast Survey in 1854. Called Panama Reef on English admiralty chart of 1859.

‖Named by the United States exploring expedition, 1841.

¶Called Isla de Pacheco by Eliza in 1790; McLaughlin's Island by the United States exploring expedition in 1841; named Lummi Island in 1853 by the United States Coast Survey, because inhabited by that tribe. It is known by no other name.

Matia Group,* with the north end of Lummi Island. From Point Lawrence, along the north face of Orcas Island, 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 two thousand four hundred and twenty-three feet high.

The geographical position, as determined by the Coast Survey in 1854, is:

Latitude	48° 40′ 37.2″ north.
Longitude	122 49 00.83 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 Island*‡ and *Barnes Island*,‡ close under its western side, leaving a channel a mile wide between it and the north shore of Orcas Island, with very deep water and no anchorage. Abreast of Clark Island, on Lummi Island, is a contracted anchorage and shelter from northerly winds, under a low point called Village Point.‡ The anchorage is in ten to fifteen 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 eight to fifteen fathoms. Close to Clark and Barnes Islands the depth is fifty and sixty fathoms, and a very strong current runs near them. The channel between Village Point and these islands is two miles wide.

West-southwest of the north end of Lummi Island, and four miles distant, are three islands very close together, called the *Matia Group*.* 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 ten to fifteen fathoms, sticky mud bottom.§ To the westward of this group lies *Patos Island*, and a much smaller one close to its southwest point. The eastern point of Patos Island bears west three-quarters south, nine miles from the north end of Lummi Island. Two or three miles north-northeast 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 northwest 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 north by west half west, distant two and a quarter miles. Between these two points anchorage may be 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

---

*Called "Edmund's Group" by the United States exploring expedition in 1841. The small one on the east is called Puffin Island on the English admiralty chart of 1859; in 1854 it was named Matia East by the United States Coast Survey.

†Named by the United States exploring expedition in 1841. The Indian name is Sweh-lagh.

‡Named by the United States exploring expedition, 1841.

§Partially examined by the United States Coast Survey in 1853 and 1853.

Bay. In this passage one and a half miles, and bearing east by south half south from the north end of 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.
Matia Island, east, longitude	122 48 28.6 west.
	° ′ ″
South end of Strawberry Island, latitude	48 33 34.3 north.
South end of Strawberry Island, longitude	122 43 26.7 west.
	° ′ ″
Southwest Island,* off Lopez Island, latitude	48 24 53.3 north.
Southwest Island, off Lopez Island, longitude	122 48 33.9 west.

ALDEN SHOAL.

From the north point of Lummi, an extensive shoal bears west by north one-quarter north distant five and one-third miles, and northwest by north half north three and one-half miles from the eastern island of the Matia group. It lies upon the last direct course out of the strait, but has not been completely sounded out. Within the fifteen-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 two and three-quarters fathoms, and this spot bears north 35° west, three and one-half miles from the eastern islet of the Matia group.

From about its middle part, we have the following bearings of prominent objects:

Eastern islet of Matia group, southeast by south half south three and one-half miles.

North point of Lummi Island, east by south one-quarter south five and one-third miles.

Northwest point of Sucia group, with the wooded island of the Skipjacks just open, southwest one-quarter south four miles.

* So named by the United States Coast Survey in 1854; called Colville Island on English Admiralty Chart No. 1911.

This position will bring the west side of Clarke's Island just on with Point Lawrence.

The shoal was discovered by Lieutenant (now Commodore) James Alden, United States navy, assistant Coast Survey in 1853.

It is named Alden's Bank on the English admiralty chart of 1859.

GULF OF GEORGIA.*

Once on the Gulf of Georgia, through either channel, the three-mile face and timber-covered bluffs of Point Roberts† (showing almost an island) are seen in 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 two hundred 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 it head ten thousand nine hundred feet above the level of the sea. To the west-northwest stretch the waters of the Gulf of Georgia, nine miles wide, abreast of Point Roberts, where it is narrowest, but spreading out to twenty miles, and having a length of one hundred and twenty. A short distance above the forty-ninth parallel, it receives Fraser 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, sailing vessels hold well to the eastern shore to avoid the rushing currents, and to take the chances of an anchorage if the wind fails.

From Sandy Point to *Point Whitehorn*,§ the general trend of the shore is northwest half west, and the distance seven miles. The shore is a steep bluff, about one hundred and fifty 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 northwest from Whitehorn, and distant three miles. The bay runs north-northeast two and a half miles, with a width of one and a half. The bottom is very uniform, with capital holding-ground of soft mud in from four to ten 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 fifteen to twenty fathoms a mile outside, and ten fathoms water on the line of the entrance. During the heaviest southeast weather no swell is felt here in a properly selected

* Named by Vancouver, 1792.

† Named by the United States exploring expedition, 1841. The Indian name is Now-uk-sen.

‡ Named by Vancouver, 1792. In April, 1865, the sharp peak was reported to have sunk one thousand or fifteen hundred feet after a violent eruption; but in 1867, we saw no change from its appearance between 1853 and 1857.

§ Named by the United States exploring expedition in 1841.

anchorage. We searched for fresh water, but found none in the space of more than a mile along its southeastern side.

The geographical position of Point Whitehorn, as determined by the United States Coast Survey, 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 on the eastern shores of the Gulf of Georgia to which our personal examinations have extended.

DRAYTON HARBOR.

Passing the bluff northwest of Birch Bay the shore trends about north-northeast for nearly three miles, and terminates in a long, low, sandy point, behind which lies Drayton Harbor, a small land-locked bay, having a depth of ten 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 northwest by west three-eighths west, half a mile distant, the anchorage would be in six fathoms. South of this position it shoals gradually for over half a mile to twelve feet, with sticky bottom.

The approaches to the bay do not show over five 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 sight having been selected on account of fresh water, but it has an extensive flat in front.

Drayton Harbor was examined and named 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 three hundred to four hundred feet high, covered with fir. The bottom is very regular, and the depth ranges from ten fathoms, soft bottom, about two miles south of the bluffs, to three 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 *4h. 50m.*, and the difference between the greatest and least intervals is *2h. 24m.* 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.*

The two tides of the same day are generally unequal in proportion to the moon's declination. The times and heights can be obtained approximately from the following table.

Moon's declination.	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High water.		Low water.		High water.		Low water.	
	Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
	H. M.	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*
Greatest north	15 24	8.4	23 35	—1.4	19 35	9.0	24 06	7.5
Zero	17 09	8.1	23 27	2.0	17 09	8.1	23 27	2.0
Greatest south	19 35	9.0	24 06	7.5	15 24	8.4	23 35	—1.4

The interval is to be added to the time of the moon's meridian passage, to give the time of high and low water. The time of the moon's upper meridian passage is given in the Almanac; and the time of its lower meridian passage is the middle between two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest low waters; to which level the soundings on the chart are given.

Spring Tides.—At the full and change of the moon the high waters will be 0.4 foot higher than the above; and the low waters 0.6 foot lower.

Neap Tides.—At the moon's first and last quarters, the high waters will be 0.4 foot lower than the above, and the low waters will not fall as low by 0.6 foot.

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 of 1855, but on more recent editions it is called Boundary Bay.

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 northwest by west about eighteen miles. From Point Whitehorn it bears west distant twelve miles.

On the outer or Gulf of Georgia side of Point Roberts the shore runs about northwest one-quarter west for nine 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 west by north, and distance nine and two-thirds miles. The south face runs east-northeast two and a half miles, and presents for nearly the entire

distance a bold bluff about one hundred and fifty feet high, and covered with wood. Half a mile off this shore, anchorage may be had in from ten to fifteen fathoms, but in southerly weather it must be avoided. The eastern shore of the point runs nearly parallel with the western for four or five miles. Off the southeast point, rocks and foul bottom extend southeast 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 Cêpéda 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 this river on the gulf edge of the Sturgeon Bank, lies west by north nine and two-thirds miles from the southwest part of Point Roberts. That part of the bank south of the river is now called Roberts' Bank, and that to the northward retains the name Sturgeon Bank, given to the whole by Vancouver in 1792.

The current of the river is said to have a velocity of from five to eight 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 eleven 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 eleven 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 nine feet. The spar is painted black and white in horizontal stripes, and surmounted by a red ball.

1. A spar-buoy moored in twelve 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 twelve feet. The spar is painted white and surmounted by a black diamond marked 2.

3. A spar-buoy moored in eleven feet. The spar is painted white and surmounted by a red diamond marked 3.

4. A spar-buoy moored in eleven feet. The spar is painted white and surmounted by a crescent red and black marked 4.

5. A spar-buoy moored in twelve 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 buoys should not be approached within half a mile until the passage between them is brought to bear north half east, when a vessel may steer in, in mid-channel, or pass the north sand head buoy and the first one inside it about three hundred yards.

The remaining five buoys on the north side of the channel may be passed from one hundred to two hundred and fifty yards, keeping them on the port hand. After passing the inner buoy, a straight course for Garry Point may be steered.

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 three miles in clear weather.

By following the foregoing directions, a vessel drawing from fifteen to sixteen 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.

LIGHT-SHIP AT ENTRANCE TO FRASER RIVER.

A light-vessel has been established at the sand heads, entrance to Fraser River, and off the western edge of Roberts' Bank. The vessel is painted red, with the words "South Sand Head" in white letters of two feet in length on her sides; she has two masts, and carries at the main a skeleton ball five feet in diameter.

The light is a *fixed white light*, and in clear weather can be seen at a distance of eleven miles.

In foggy weather a bell is sounded.

The vessel lies in ten fathoms water, with Garry Point bearing north by east three-quarters east easterly, distant five and one-fifth miles; north Sand Head buoy

northwest by north one-quarter north, distant seven cables; and the south Sand Head buoy east-northeast, distant two cables.

The approximate geographical position of the light is:

	°	′	″	
Latitude	49	03	30	north.
Longitude	123	17	16	west.
	h.	*m.*	*s.*	
Or, in time	8	13	09.1.	

The magnetic variation was 22° 35′ east in 1866.

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 named the *Sturgeon Bank* in 1792.

NANAIMO BAY.

This bay lies on Vancouver Island, north of the forty-ninth parallel, and we refer to it because large supplies of the best coal in this region are there obtained, and it is used by all the steamers in these waters.

The outer entrance to the harbor is in latitude 49° 12′ north, longitude 123° 51′ west, and bears west one-quarter north thirty-three miles from Point Roberts. From the entrance the mid-channel course runs south half west 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 west-southwest a mile distant, with a small islet in front of them. The bottom is uneven; some sunken rock occur, and the anchorage near the rivers is so contracted that the 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 Survey brig Fauntleroy drifted, with thirty-eight fathoms of chain at her bows, in a calm, for miles along, and within eighty yards of the rocks before she brought up. In one or two instances preceding this the lead indicated bottom in ten fathoms, the next cast showing forty or fifty fathoms.

ARCHIPELAGO DE HARO.

THE TWO STRAITS.

With plenty of wind no navigation could be better than that in these channels; but in a calm, sailing vessels will frequently be jammed close to rocks, with only a few fathoms inside of their positions, but forty or fifty 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 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 Cordova Bay, but it is free of known hidden dangers, except *Unit Rock*, and the continuation of the reef off Darcy Island. It makes a right angle in its course, but is a mile wider, and has much deeper water than Rosario Strait, which is less curved; has several anchorages and known dangerous rocks, with a current of about one and a half miles less per hour. For steamers, either channel, or even some of the narrow intermediate channels, may be used. The winds are apt to fail in both channels, and during summer frequent calms prevail.

Steamers bound through the Gulf of Georgia from the Strait of Fuca take the Canal de Haro to the entrance of the Swanson Channel, abreast the west end of Stuart Island; through that channel to the Active Pass, and thence to the Gulf of Georgia; thus avoiding the currents of the northern part of the Canal de Haro.

On the recent United States Coast Survey maps this aggregation of islands and channels has been named Washington Sound.

BELLINGHAM BAY.

After leaving Rosario Strait, the course upon entering the Bellingham Channel,* two miles wide, opening south of Cypress Island, is northeast for two miles. The width then decreases to a mile, upon turning sharp around the southeast point of Cypress; and to the eastward are seen the bright, yellowish bluffs of *Guemes Island.* Between these two islands the channel runs about three miles on a north by west half west 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 northeast is *Vendovi.*† Pass north of it, but south of the small islet, (off Eliza Island,) which is two miles northeast by north from the northwest point of Vendovi, and the southern part of Bellingham Bay opens to the southeast; its northern part opens to the north-northwest. If the current be flood and the wind light, keep close around

* Named by the United States Coast Survey in 1854.
† Named by the United States exploring expedition, 1841.

Guemes and Vendovi, so as not to be set past Sinclair Island. The low, bare, rocky islets, one and a half mile northwest of Vendovi, are the Viti Rocks;* and the point between them and Eliza 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.† 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 southeast and northwest; its width three miles, and length fourteen, extending from latitude 48° 33′ to latitude 48° 48′. The depth of water ranges from three to twenty fathoms, with good sticky bottom.

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. In 1868 the mines were abandoned on account of the fires raging through them.

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 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 six hundred and twenty-seven 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 southeast by south direction, for sixty miles, to the south end of Vashon Island. It has for that length an average width of three and a half miles, and then branches into a multitude of arms, which cover an area of about fourteen by twenty-two miles. Their general direction is southwest three-quarters south, and they comprise what is called Puget Sound.

At sixteen miles from the entrance to the inlet, an arm, called Hood's Canal,

* Named by the United States exploring expedition, 1841.

† The Indian name for "Noisy Water," the outlet of the lake.

opens upon the western side, and runs sixty miles south by west, with an average width of one and a half 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 fifty to five hundred feet in height, with their sides kept bright by 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 one hundred 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 Sound, have an aggregate shore-line of not less than eight hundred and three miles, yet the number of dangers known to exist in them is remarkably few.

One of the inlets or arms of Puget 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 sixty-five miles, in a direct line, of the Columbia River, at the mouth of the Cowlitz, which is fifty-two miles from Cape Disappointment; and within twenty 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 twenty-eight 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, fifty-two 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 navigable for large boats to Gray's Harbor, to which a small steamboat makes trips. We judged the stream to be about one hundred 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 cling 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 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 will 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 southeast by south half south, four and a half miles; and the bluff head lying two or three miles to the east of this line, destitute of trees, and marked by a light-house, is Admiralty Head, around which the ebb current, and an ebb eddy on the flood, sweep with force.

The first course inside of the entrance of the inlet is east-southeast six and a half miles, passing Port Townshend on the south, Admiralty Head on the north, and changing the course abreast of Marrowstone Point on the west-southwest.

POINT PARTRIDGE.

This 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 thirty-five feet above the ground inside; yet being overgrown with bushes, the ridge is now permanent.

The highest part of the point is about two hundred and sixty feet above low water.

The triangulation station of the Coast Survey was on the southern part of the point, and its geographical position is:

	° ′ ″
Latitude	48 12 59.3 north.
Longitude	122 45 06.7 west.
	h. m. s.
Or, in time	8 11 00.4

From Point Wilson it bears northwest by north half north, four and a quarter miles.

From Admiralty Head light-house northwest by west three-quarters west, five and a quarter miles.

From New Dungeness light it bears north by east one-third east, fourteen 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 Sound, &c., and in proximity to the great labyrinth of inland waters of British Columbia. The

entrance lies between Point Wilson* and Marrowstone Point,* the latter bearing east-southeast three and five-eighths 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 six to fifteen 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 one and three-quarters miles, southeast by south half south.

Starting from the entrance line, about one and a half miles from Marrowstone, the mid-channel course of the bay is south-southwest, three miles, with an average width of two; thence southeast one-third south for three and a quarter miles, with an average width of one and a quarter. The depth of water throughout is very regular, and ranges from eight to fifteen 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 twenty fathoms are found one hundred or two hundred 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 five to ten 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 town in ten to twelve 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 ebb current, 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 breath 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 3*h.* 49*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 feet 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,

* 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 United States Exploring Expedition, 1841.

and when the moon's declination is zero 1.4 feet and 1.4 feet. 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 feet 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.

The two tides of the same day are generally unequal in proportion to the moon's declination. The time and height can be obtained approximately from the following table:

TIDE TABLES FOR PORT TOWNSHEND.

TABLE 1.

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	2 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

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 31	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	

NOTE.—To use this table 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 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	8.5	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.															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	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

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 59.3

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, two and a half miles south by west 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, six miles distant; in the middle ground several distant, wooded ridges, and in the back ground the snow-covered, double summit of Mount Baker, ten thousand nine hundred 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 three thousand one hundred and forty-five 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 six 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 one hundred and twenty 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 five-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.

Marrowstone Point is a low sandy point stretching three hundred yards eastward from the base of the bluff, and forming an indentation on its southern face, where anchorage may be had in twelve 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 two or three miles above the point.

It received its present name from Vancouver in 1792.

ADMIRALTY HEAD.

Directly opposite the entrance to Port Townshend is Admiralty Head, or Red Bluff, a perpendicular cliff eighty feet high, falling on the eastern side to a low, pebbly shore, which runs two miles to the east-northeast, 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 fifteen to twenty-five 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 forty-one feet, and the elevation of the focal plane above the mean level of the inlet is one hundred and nineteen 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 08.0 west.
	h. m. s.
Or, in time	8 10 40.5.

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 Blunt's Island light is hidden by Point Partridge.

From Point Wilson it bears northeast by east, distant three and a quarter miles.

From Marrowstone Point north by west one-quarter west, distant three and a quarter miles.

From New Dungeness light east by north half north, distant seventeen and two-thirds miles.

From Point Partridge southeast by east three-eighths east, distant five and two-thirds 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 southeast by south one-third south for seven miles. The shores on either hand are bluffs of apparently uniform height, covered with trees. About five 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 Bay. Off this point is good anchorage in twelve or fifteen 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 east-southeast 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 eleven fathoms, affording an excellent fishing ground. At the end of the course, Oak Bay‡ opens to the westward, and stretches toward 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 five to fifteen fathoms, except north-northwest of Basalt Point, where it reaches twenty-five and thirty fathoms. The length of the bay is three miles, and its average width about one and a half miles. 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

* Named by the United States Coast Survey in 1855.

† Named by Vancouver in 1792. The Indian name for Foulweather is Pitch-pol.

‡ Named by Vancouver in 1792.

§ Named by the United States Coast Survey in 1856

nearly a mile, less than fifteen fathoms may be found. Kelp exists under the face of the bluff, and vessels may pass around it in six and seven 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 east-southeast for ten miles, passing, on the eastward, Double Bluff, which stretches northeast for a mile, and rises three hundred or four hundred feet in height, having its top covered with wood. The bluff running also to the northward forms Useless Bay.* This bay 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 two miles east by south 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 three hundred 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 eight and ten 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 five fathoms, but want of time precluded his examining it.

On the western side of the last mid-channel course Foulweather Bluff was passed. It is perpendicular on its north-northwest face, and about two hundred and twenty-five feet high, with heavy firs upon its summit. It slopes towards the east to a bluff forty feet high, but is steep on the side next to Hood's Canal. The low point four 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 three and four feet diameter. On the south side of Point No Point is good anchorage in ten fathoms; and thence the western shore runs nearly straight southeast by south for ten miles.

At the end of the last course, which carried us three miles beyond Point No Point, the inlet expands to a width of seven miles. A course east-northeast for three miles and a half carries us to the entrance of Possession Sound, the first six

* Named by the United States Exploring Expedition, 1841.

† Discovered and named by the United States Coast Survey, 1856.

‡ Named by the United States Exploring Expedition, 1841. The proper spelling is Skadg′-it, and the Indian name of the point, Skoolhks.

§ Named by United States Exploring Expedition, 1841. The Indian name for the point is Hahd-skus.

miles of which run north half west, with a width of two 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 eastern shore, four miles after entering, is Point Elliott,* and the bay opening to the northeast receives the Sinahomis or Scaget River.

The next or fourth mid-channel course up the inlet is south-southeast for twenty-one miles to Allen's Bank, which lies a mile off the north end of Vashon 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 five to twelve 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 three 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 n ine-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 three miles west-southwest, with an average width of two miles and a large depth of water, except under Point Jefferson, where anchorage may be had in ten and fifteen fathoms, hard sandy botton, 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 saw-mills. At the southwest part of the bay is the very narrow entrance to Port Orchard. The channel is somewhat crooked, but it has three and four 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 fifteen to twenty-five fathoms of water. After passing the first point, an arm opens to the northwest, and many

* Named by United States Exploring Expedition, 1841.

vessels load there with spars. Ten miles up the southern channel is an arm five miles long, stretching to the west-northwest. The depth of water ranges from three to seventeen fathoms, and at the upper basin are found beds of oysters. A saw-mill has been erected on this arm. In coming out of Port Orchard vessels should not trust the southern entrance, but leave as they entered. See remarks under heading, "Restoration Point."

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 eight or nine miles long by two and a half in breadth, and its general direction is southeast by south. A few loggers' huts stand on the western side, and the Madison saw-mill at the north end. On the southeast part it is indented by two small harbors. It was named by the United States Exploring Expedition in 1841.

SÉATTLE AND 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 east by south six and a half miles and has a width of two 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 southeast by south, and distance four and a half miles. Under West Point there is anchorage in ten to fifteen fathoms after getting towards the bluff; but on the north side of the point the water is very deep. Through the center of the bay the depth ranges from eighty-eight to forty fathoms. On the north side of Battery Point a vessel anchoring in twenty fathoms cannot have a greater scope of chain than thirty-five fathoms without being too close to the shore. When we anchored there in thirteen fathoms and veered to twenty-five fathoms of chain the vessel's stern was in two and a half 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, two miles north-northeast of Battery Point, is Duwamish Head.‡ It is steep, about one hundred and fifty feet high, covered with timber, and the beach at low water stretches out over a quarter of a mile north-

* Named by the United States Exploring Expedition, 1841.

† Named by the United States Coast Survey, 1856. The English Admiralty Chart No. 1911, with corrections to 1865, calls this Roberts' Point, although there is the same name at the mouth of Frazer River. The Indian name is Me-kwah-mooks.

‡ Named by the United States Coast Survey, 1856.

northwest 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 northeast part of the bay, a little over five 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.

The usual anchorage is directly off the wharf in ten to fifteen fathoms water, with the large white house on the extreme point bearing about east or east by south, and at a distance from the beach of about five hundred 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 fifteen fathoms is struck, go about, for it shoals to three 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 in to the inlet; and if bound up, should 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, should work under the north shore, about three and a half miles to Magnolia Bluff, beyond a low marshy indentation in the shore, or until they can fetch well clear of Battery Point. From Seattle there is telegraphic communication with San Francisco, Portland, Olympia, Steilacoom, Bellingham Bay, and Victoria.

There is some good agricultural prairie land on the Duwamish River. Some distance up, it is connected with a series of lakes that stretch to the west-northwest and by a small stream reach the inlet just north of West Point. Among these lakes good coal is reported. Lake Washington is reported to be twenty-five miles long, and two or three miles wide, with islands in it. It is but a few miles in a direct line east of Seattle.

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 southeast 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 three or four hundred yards southeast from its north point; and next, at Point Restoration, by Blakely Harbor,* having off its entrance a large rock, fifteen feet high, with deep water all round it. The rock bears

* Named by the United States Exploring Expedition, 1841.

nearly north-northwest, three-quarters of a mile from the point, and the bottom between is irregular, the depth ranging from twenty to forty fathoms. Blakely Harbor is only a quarter of a mile wide, and three-quarters long, with eighteen fathoms sticky bottom at its mouth, and shoaling gradually inside, but most on the south side. A hydrographic sketch of the harbor is given 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 three hundred yards it is flat, about ten 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 Point, or a little south of it. Inshore it rises up sharply about one hundred feet, its sides covered with grass, and the summit with fir trees. Around the whole southeast 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 three hundred yards, but the depth is six fathoms one hundred yards off its extremity, and sixteen fathoms at a quarter of a mile. On the tail of this ledge the United States sloop of war Decatur struck in 1855. South-southeast of the point, anchorage may be had in fifteen 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 east by north half north, distant two and a half miles.

Tides.—The approximate corrected establishment is *4h. 4m.*, 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,

* Named by the United States Exploring Expedition, 1841.

crooked pass, three 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.

The last course reached Allen Bank,* off the north end of Vashon 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 ten fathoms upon it, with a variable bottom, in some places mud and in others hard sand. At our anchorage upon it in eleven fathoms, the south end of Blake Island bore west three-quarters north, and the northwest point of Vashon Island south half east. Between the anchorage and Blake Island the water regularly deepens to about eighteen fathoms, in soft mud. This anchorage has proved of great service to vessels losing the wind and having adverse currents. In some recent maps, twenty-five to thirty 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 seventeen and eighteen fathoms, soft mud. The northeast point of Vashon 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 Island.

The extent of shore-line, from the entrance of Admiralty Inlet to the north end of Vashon Island, is two hundred and forty-one miles.

The main body of the inlet continues about southeast for eight miles, and then south-southwest eight miles further, with an average width of two 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, northeast 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, four miles south of Brace Point, is called Point Pulley.‡ 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 Pulley 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 ten and twelve fathoms,

* 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.

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 stream comes 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 fourteen fathoms, hard bottom.

Colvos Passage is the usual, we may say the invariably used, ship channel towards Puget 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 eleven miles long to the south end of Vashon Island, which is called Dalco Point,* and it runs with a nearly straight course south by east. 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 five and ten 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 east-southeast, and over its low background shows the high snow-covered peak of Mount Rainier. The general direction of the bay is east by south half south, 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.

The Indian name for this bay is Puyallup.

Vashon Island, lying between the southern extremity of the inlet and Colvos Passage, is eleven and one-half miles long, with an average width of two and one-half 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 forty to fifty fathoms deep. The English Admiralty chart No. 1911 notes this peninsula as an island named Maury Island, with nine feet water where it is nearest Vashon.

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

* Named by the United States Exploring Expedition, 1841.
† Named by the United States Coast Survey, 1857.

was called Quartermaster 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 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 southeast 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 fifteen fathoms, with swirling eddies. On the south face of this peninsula, and outside of the kelp, anchorage may also be had.

PUGET SOUND.

This collection of inlets commences after passing "The Narrows," and covers an area of fourteen miles by twenty-two, with a general direction southwest three-quarters south. The aggregate shore-line of this sound, and the adjacent part of Admiralty Inlet, with Colvos Passage, to the north end of Vashon Island, is not less than three hundred and seventy 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 Sound, nine miles south of Point Defiance, is situated the town or village of Steilacoom, upon a rising bluff. It consists of 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 in fifteen fathoms, hard bottom, and about four hundred or five hundred yards from the shore. An island lying two and one-quarter miles distant, and 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 the Balch Passage. It bears about southwest by west 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

* Named by the United States Exploring Expedition in 1841.

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 one and one-half miles 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 south-southeast, one mile from the south end of Fox Island, and northwest by west one and three-quarters miles 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 the 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 4*h.* 46*m.* The mean rise and fall of tides is 9.2 feet, of spring tides, 11.1 feet, of 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 7.7.

The tides of the same day are generally unequal in proportion to the moon's declination. The times and heights can be obtained approximately from the following table:

Moon's declination.	Moon's upper meridian passage.				Moon's lower meridian passage.			
	High water.		Low water.		High water.		Low water.	
	Interval.	Height.	Interval.	Height.	Interval.	Height.	Interval.	Height.
	H. M.	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*	*H. M.*	*Feet.*
Greatest north	16 09	11.1	23 44	—0.8	18 30	12.6	23 59	8.5
Zero	17 00	12.9	23 25	2.6	17 00	12.9	23 25	2.6
Greatest south	18 30	12.6	23 59	8.5	16 09	11.1	23 44	—0.8

The interval is to be added to the time of the moon's meridian passage, to give the time of high or low water. The time of the moon's upper meridian passage is given in the Almanac, and the time of its lower meridian passage is the middle between two successive upper passages. The heights are given in feet and tenths, and show the rise above the level of the average of the lowest low waters, to which level the soundings on the chart are given.

Spring tides.—At the full and change of the moon the high waters will be 0.7 foot higher than the above, and the low waters 0.9 foot lower.

Neap tides.—At the moon's first and last quarters the high waters will be 0.7 foot lower, and the low waters will not fall as low by 0.9 foot.

From Steilacoom there is telegraphic communication with San Francisco, Portland, Olympia, Seattle, Bellingham Bay, and Victoria.

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 twenty-one miles in length, and its width from half a mile to a mile and a half.

Olympia is situated at the head of Budd 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 head-waters 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 Inlet, within one and a half miles 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.

TIDES.

The approximate corrected establishment is 5*h.* 8*m.*, and the mean rise and fall of tides 9.2 feet.

The greatest difference between the highest and lowest tides is reported about twenty-four feet, and is doubtless more than this, when we compare its position with that of Steilacoom.

The approximate geographical position of the wharf, as determined by the United States States Coast Survey, is:

	° ′ ″
Latitude	47 03 00 north.
Longitude	122 55 00 west.
	h. *m.* *s.*
Or, in time	8 11 40.0

*Named by the United States Exploring Expedition in 1841.

The computed magnetic variation was 20° 47′ east in July 1856, and the present yearly increase 1′.

A hydrographic reconnaissance of Budd Inlet was published by the Coast Survey in 1856.

From Olympia there is telegraphic communication with San Francisco, Portland, Steilacoom, Seattle, Bellingham Bay, and Victoria.

Saw-mills have been built on Hammersley Inlet* and on Henderson Inlet.*

HOOD'S CANAL.†

The entrance to this arm of Admiralty Inlet lies between Basalt Point and Foulweather Bluff, the latter bearing east three-quarters south, distant three and one-third miles from the former.

The first mid-channel course is southeast 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 with the main by a narrow neck of low sand beach. This is frequently mistaken for an island, and is named Hood's Head.‡ Between this head and Port Gamble the canal changes its course and runs in nearly a straight line south by west forty miles, with an average width of one and a half miles. In latitude 47° 21′ north it makes an abrupt turn, and runs for twelve or thirteen miles about northeast.

PORT LUDLOW.

Close to Basalt Point lie some rocks, with others about half a mile southeast, called the *Colvos Rocks*,† among which is one twenty-five 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 fifteen fathoms water, having soft, muddy bottom. The bright bluff head, one and a quarter miles southeast of the Colvos Rocks, and about two miles southwest by west from Foulweather Bluff, is *Tala Point*.* Half way between the Colvos and this point is the usual entrance, over a sand bar having four and a half fathoms. The three-fathom line stretches half a mile southeast 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 south-southeast two and a half 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 eighty feet, but it is not used.

* Named by the United States Exploring Expedition in 1841.
† Named by Vanconver, 1792.
‡ Named by the United States Coast Survey in 1856.

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 half a mile long, about one hundred 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 Mats-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 ten or fifteen 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 fifteen feet, the black in twelve and a half, and the small spar buoy between them in mid-channel in seventeen feet, but it rarely shows above water at any tide. After passing these buoys, the mill bears almost south-southeast, half a mile distant. Steer southeast, or half way between the mill wharf and the east point, pass to the east of the white spar buoy, which is in twelve and a half feet, and run through the entrance, passing the wharf at about one-third of the distance between the points. Do not run 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, (1857.)

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 one hundred 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 three-fathom line makes out on a line with the end of the point. On the western side was a crib, around which a shoal was forming; 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 two and a quarter 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 capi-

tal chances for hauling 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 southeast 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 a few of those have done so within the channel limits.

The geographical position of the eastern point of the entrance, as determined by the United States Coast Survey, 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 fifteen; the average passage twenty-six and a half days; the shortest passage nineteen days, and the longest thirty-two. From the islands to the mill the number of vessels arriving was sixteen; average passage twenty-five and a half days; shortest passage fifteen days, and the longest thirty-five days. Of these one reported a passage of fifteen 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 United States 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 north-northwest, 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 twenty fathoms. Keep, however, close under the northern shore, which runs two miles west-southwest from the low point called *Termination Point.**

* Named by the United States Exploring Expedition in 1841.

Fourteen miles from Hood's Head the canal curves more to the southward, and then to the south-southwest, 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 seven thousand seven hundred and seventy-seven 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 ten to fifteen 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′ north, ("Vancouver's farthest,") where it takes an abrupt turn, and stretches east by north half north four miles. The width in that part contracts to half a mile, and the shores overlap. From this it takes another slight bend, runs northeast by north eight or nine miles, and reaches within two or three miles of the northern extremity of Case Inlet,‡ an arm of Puget 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 one hundred and ninety-two 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 in the waters of Fuca Strait, Admiralty Inlet, and Puget Sound, the instruments being kept in the best shade practicable. The barometer was an aneroid, read at the hours of 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.

---

* Named by Vancouver in 1792.

† Named by the United States Coast Survey in 1855.

‡ Named by the United States Exploring Expedition, 1841.

Abstract of meteorological observations, made on board the United States Coast Survey brig Fauntleroy, in the Strait of Juan de Fuca, Archipelago de Haro, Admiralty Inlet, and Puget 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.
	°	°	°	°	°	°	°	*In.*	
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 southeast 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.
	°	°	°	°	°	°	°	*In.*	
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.

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.
	°	°	°	°	°	°	°	*In.*	*In.*
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

In the winter of 1866–'67 the following observations were made by the United States Coast Survey party:

	Clear days.	Rainy days.	Fog or mist.	Inches of rain-fall.
November 1866	2	25	3	9.892
December 1866	3	25	3	8.260
January 1867	7	18	2	7.506
February 1867	2	24	2	5.197
March 1867	22	8	1	0.880
April 1867	22	8	0	2.371
				34.106

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 sixty 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 Kadiak, Alaska, for the San Francisco market.

Table of geographical positions of important headlands, bays, rivers, light-houses, &c., on the western coast.—Compiled for this Coast Pilot.

EXPLANATION.—Primary astronomical stations of the United States Coast Survey 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; G., green; R., red; Pr., prolonged; Nat., natural olor; 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.

Name of station.	Locality.		Latitude north.	Longitude west.		Magnetic variation, east.	Time of determination.
				In arc.	In time.		
CALIFORNIA.			° ′ ″	° ′ ″	h. m. s.	° ′	
Banco Cortes	10 fathom spot off Bay of Todos Santos, Mexico, 50 miles south 30° east from Bishop Rock.		31 38	118 48			
Los Coronados, (belonging to Mexico)	The highest part of the largest islet		32 23 46	117 13 21	7 48 53.4		
Initial Point	Monument on the boundary between Mexico and the United States.		32 31 58.5	117 06 11.1	7 48 24.7		
Point Loma light-house, III—F. W.—29	West side of the entrance to San Diego Bay, 450 feet above sea		32 40 13.0	117 12 22	7 48 49.5		
SAN DIEGO	Observatory Hill, near La Playa, San Diego Bay		32 41 57.6	117 13 22.0	7 48 53.5	12 29	*Apr. 1851.
San Clemente. 2 A	At the northwest extremity of the island	Santa Barbara Channel.	33 02	118 34 00	7 54 16.0		
Cortes Shoal	Two and a half fathom spot. The Bishop Rock		32 25¾	119 05			
San Nicolas. 2 A	At the southeast end of the island		33 14 11.6	119 25 00	7 57 40.0		
Santa Catalina. 2 A	At the great transverse break of the island, (north side)		33 26 34.7	118 28 45	7 53 55.0		
Santa Barbara Island	23 miles west by south from the north end of the Santa Catalina.		33 30	119 02			
San Pedro Bay. 2 A	Edge of the bluff at the landing		33 43 19.6	118 16 03.0	7 53 04.2	13 30	Nov. 1853.
Anacapa	Eastern point of the island		33 01	119 19			
Point Hueneme, *proposed light-house site*	North side of the eastern entrance to the Santa Barbara Channel.		34 08	119 09	7 56 36		
Prisoners' Harbor. 2 A	North side of the island of Santa Cruz		34 01 09.8	119 40 00.0	7 58 40.0		
Cuyler Harbor. 2 A	At the northeast part of the island of San Miguel		34 03	120 20 27.0	8 01 21.8		
Santa Barbara light-house. IV—F. W.—20½	Two miles southwestward of the landing, 180 feet above sea.		34 23 35.4	119 42 05.0	7 58 48.3		
Santa Barbara. 2 A	At the landing		34 24 24.7	119 40 18.0	7 58 41.2		
Point Concepcion light-house. I—Rv. W. Fl. ½ M.—23—Bell	Point Concepcion, 250 feet above sea		34 26 46.6	120 27 00	8 01 48.0		
POINT CONCEPCION	Valley of El Coxo		34 26 56.5	120 25 39.0	8 01 42.6	13 50	Sept. 1850.
Point Arguello	12 miles northwest by west half west from Point Concepcion		34 34	120 38			
San Luis Obispo Bay. 2 A	At the small gully west of the creek		35 10 37.5	120 43 31.0	8 02 54.1	14 17	Feb. 1854.

San Simeon Bay. 2 A	Near the landing	35 38 24.4	121 10 22.0	8 04 41.5		
Piedras Blancas	White rocks near San Simeon Bay, outer one	35 39	121 15			
Point Sur	51 miles southeast one-third south from Point Año Nuevo	36 19	121 52			
Monterey	At the end of the wharf abreast custom-house	36 36 11	121 52 27	8 07 29 8		
Point Pinos light-house. III—F. Nat.—16	At the northwest point of the trees, 91 feet above sea	36 37 51.8	121 55 00.0	8 07 40.0		
POINT PINOS	Southwest point of Monterey Bay, near light-house	36 37 59.3	121 54 25.0	8 07 37.7	14 58	Feb. 1851.
Seven-fathom Shoal	Reported 80 miles south-southwest from southeast Farrallon	36 42	124 10			
Santa Cruz Harbor. 2 A	At the Embarcadero, northern part of Monterey Bay	36 57 26.9	122 00 10.0	8 08 00.7		
Point Año Nuevo, ***proposed light-house site***	40 miles southeast by south from San Francisco Bar	37 07	122 19			
Reed Rocks	Reported off California coast	37 25	137 30			
Point San Pedro	13 miles south by east half east from Boneta light	37 35 45	122 30 34	8 10 02.3		
South Farrallon light. I—Rv. W. Pr. Fl. every M.—27.—Whistle.	23½ miles southwest by west one-quarter west off entrance to San Francisco Bay, 360 feet.	37 41 48.8	122 59 05.2	8 11 56.3		
Point Lobos, ***proposed light-house site***	The south head of entrance to San Francisco Bay	37 46 50.5	122 29 39.5	8 09 58.6		
Rincon Point. 2 A	Northeast of South Park, San Francisco City	37 47 00.7	122 22 32.0	8 09 30.1		
PRESIDIO	Near the Presidio of San Francisco	37 47 29.8	122 26 15.0	8 09 45.0	15 27	Feb. 1852.
TELEGRAPH HILL	Near the "San Francisco Observatory"	37 47 52.8	122 23 10.0	8 09 32.5		
Telegraph Hill	Triangulation station, summit of the hill, 301 feet above bay	37 48 00.1	122 23 19.4	8 09 33.3		
Fort Point light-house. V—F. Nat.—12½.—Bell	South side and inside of the entrance to San Francisco Bay, 53 feet above sea.	37 48 31.0	122 27 37.8	8 09 50.5		
Point Boneta light-house. II—F. Nat.—25.—Bell	North head of the entrance to San Francisco Bay, 306 feet above sea.	37 49 03.7	122 30 50.3	8 10 03.4		
Alcatraz Island light. III—F. Nat.—14—Bell	In the harbor of San Francisco, 162 feet above bay	37 49 26.6	122 24 18.8	8 09 37.3		
Punta de los Reyes. 2 A	At the landing on Sir Francis Drake's Bay	37 59 35.0	122 57 36.1	8 11 50.4		
Punta de los Reyes, proposed LIGHT-HOUSE SITE	On the western part of the head, 500 feet high	37 59 39.4	123 00 13.3	8 12 00.9		
Bodega. 2 A	Bodega bay, west end of Sandy Point	38 18 20.6	123 02 17.4	8 12 09.2		
Haven's Anchorage. 2 A	On the bluff at the landing	38 47 58.0	123 34 00.8	8 14 16.0		
Punta de Arena	Northwest extremity of the point	38 57	123 45			
Mendocino Bay. 2 A	On the bluff near the landing	39 18 06.1	123 47 25.6	8 15 09.7		
Shelter Cove, (Point Delgado.) 2 A	On the bluff near the landing	40 01 13.7	124 03 02.9	8 16 12.2		
Cape Mendocino	Extremity of cape	40 25	124 22			
HUMBOLDT	Red Bluff, Humboldt Bay	40 44 40.2	124 10 30	8 16 42	17 04	Apr. 1854.
Humboldt light-house. IV—F. W.—13½	On the north point, one mile from entrance, 53 feet above sea	40 46 03.6	124 12 21.0	8 16 49.4		
Bucksport. 2 A	Town of Bucksport, Humboldt Bay	40 46 37.1	124 10 44.0	8 16 42.9	17 06	July 1853.
Trinidad. 2 A	Town of Trinidad, Trinidad Bay	41 03 20.0	124 08 08.0	8 16 32.5		
Crescent City light-house. IV—F. W. Var. by Fl.—15½	On the extreme west part of the point, 80 feet above sea	41 44 34.2	124 11 22.0	8 16 45.5		
Crescent City. 2 A	West of the town, near Point St. George	44 44.0	124 11 14.0	8 16 44.9		

* 12° 32′, September 1853.

Table of geographical positions of important headlands, bays, rivers, light-houses, &c., on the western coast, &c.—Continued.

Name of station.	Locality.	Latitude north.	Longitude west.		Magnetic variation, east.	Time of determination.
			In arc.	In time.		
OREGON.						
Port Orford. 2 A	In the town of Port Orford, near the landing	42 44 28.2	124 28 13.0	8 17 52.8		
PORT ORFORD	On the bluff west of the town, 262 feet above sea	42 44 21.7	124 28 47.0	8 17 55.1	18 29	Nov. 1851.
Cape Orford, or Blanco	Extremity of the cape	42 50	124 30			
Cape Gregory light-house. IV—F. W. Var. by Fl.—15	Northwest part of the cape off Koos Bay, 75 feet above sea	43 20 36	124 22 11	8 17 28.7		
Umpquah. 2 A	One mile from entrance to the river, (west side)	43 41 45.3	124 09 57.0	8 16 39.8		
Cape Perpetua	Middle part of the headland	44 19	124 06			
Cape Foulweather	Southern part of the cape	44 45	124 04			
Cascade Head	South part of cape	45 03	124 02			
Cape Lookout	Sharp point furthest west	45 20	124 00			
Cape Meares or La Mesa	Northwest part. The Cape Lookout of Meares and Vancouver.	45 30	123 58			
Tillamook Bay	Base of Greenhill, north side of entrance	45 32 (48)	123 57 (54)	8 15 52		
Cape Falcon, or False Tillamook	Northern part	45 47	123 58			
Tillamook Head	Southeast by south two-thirds south, 19 miles from Disappointment light.	45 58	123 59			
Astor Point. 2 A	Near Astoria, Columbia River	46 11 27.6	123 49 31.7	8 15 18.1		
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.						
Cape Disappointment light-house. I—F. W.—22½.—Bell	Near the highest part of the cape, 192 feet above river	46 16 32.7	124 02 13	8 16 08.9		
CAPE DISAPPOINTMENT	North point entrance to Columbia River, highest part, 287 feet.	46 16 35.2	124 02 00.8	8 16 08.1	20 45	July 1851.
Leadbetter Point	South point of the entrance to Shoalwater Bay	46 36 (45)	124 00 (45)	8 16 (03)		
Cape Shoalwater light-house. IV—F. W. Var. by Fl.—16	West point of the entrance to Shoalwater Bay, 87 feet above sea.	46 44 11	124 02 24	8 16 09.6		[1862.
Point Hanson. 2 A	South point of the entrance to Gray's Harbor, Fort Chehalis flag-staff.	46 53 43.7	124 06 53.8	8 16 27.6	20 53	Com. Dec. [1856.
Olympia	End of wharf	47 03 00	122 55 00	8 11 40.0	20 47	Com. Jan.
Point Grenville	Point of bluff at anchorage	47 20 43.7	124 14 53.8	8 16 27.6		
Point Pully. 2 A	East side of Admiralty Inlet, opposite Vashon Island	47 27 07.3	122 22 21.5	8 09 29.4		
Restoration Point. 2 A	Southeast point of Bainbridge Island, Admiralty Inlet	47 35 05.8	122 28 15.2	8 09 53.0		

Destruction Island	North point	47 41	124 25			
Port Gamble, or Teekalet	Four miles inside the entrance to Hood's Canal, east point	47 51 32.0	122 33 56.0	8 10 15.7		
Point Hudson. 2 A	In Port Townshend, extremity of the point	48 07 02.7	124 44 25.8	8 10 57.7	21 40	Aug. 1856.
Port Angeles. 2 A	Head of the bay, Strait of Juan de Fuca	48 07 51.5	123 27 21	8 13 49.4		
Ediz Hook light-house. V—F. W.—12¾	Extremity of point of Port Angeles, about 45 feet	48 08 25.0	123 23 34.0	8 13 35.6		
Point Wilson	West point entrance to Admiralty Inlet	48 08 42.7	122 44 49.4	8 10 59.3		
Admiralty Head light-house. IV—F. W. 17½	East side entrance to Admiralty Inlet, 119 feet above sea	48 09 21.6	122 40 08.0	8 10 40.5		
New Dungeness light-house. III—F. W.—16½.—Fog-bell	On end of the sand point, Strait of Juan de Fuca, 100 feet	48 10 58.9	123 06 07.0	8 12 24.5		
Flattery Rocks	Northwestern rocky islet	48 12	124 43			
Point Partridge	On the south part of the point, 260 feet above sea	48 12 59.3	122 45 06.7	8 11 09.4		
Blunt's Island light-house. IV—Rv. W. Var. Fl. every ½ M.—16.	Southwest point of the island, about 90 feet above sea	48 19 11.0	122 50 11.1	8 11 20.7		
NEÉ-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.
Tatoosh Island light-house. I—F. W.—20	Off Cape Flattery, Strait of San Juan de Fuca, 162 feet above sea.	48 23 15.5	124 43 50.0	8 18 55.3	21 30	Aug. 1852.
Lummi. 2 A	Sand point on northeast side of the island	48 44 01.7	122 40 36.9	8 10 42.5		
Lummi. North	North point of the island	48 44 53.2	122 42 11.9	8 10 48.8		
Point Whitehorn	South point of Birch Bay	48 53 07.3	122 46 27.1	8 11 05.8		
Point Roberts	On the southwest point of the peninsula	48 58 15.1	123 04 16.5	8 12 17.1		
VANCOUVER ISLAND.						
Race Rocks light-house. II—Fl. W. every 10 sec.—17½	Southernmost point of Vancouver, Strait of Juan de Fuca, 118 feet.	48 17 30	123 32 15	8 14 09.0		
Beechey Head	East of Sooke Inlet, Strait of Juan de Fuca	48 18 30	123 39 27	8 14 37.8		
Victoria Harbor. 2 A	Neck of Laurel Point, south side inner entrance	48 25 30.6	123 20 38.7	8 13 22.6		
Discovery Island	West side of south entrance Canal de Haro, 230 feet high	48 25 36.4	123 13 06.5	8 10 52.4		
Esquimalt Harbor light-house on Fisgard Island. IV—F. W. G. R.—15.	West side of entrance to Esquimalt Harbor, Strait of Juan de Fuca, 70 feet above sea.	48 25 38	123 27 10	8 13 48.7		
Observatory Rocks	Southeast point San Juan Harbor, Strait of Juan de Fuca	18 31 30	124 28 15	8 17 53.0		

Table of magnetic east declination on the Pacific coast of the United States for the year 1870.

Latitude north.	Longitude west of Greenwich.																	
	110°	115°	120°	125°	130°	135°	140°	145°	150°	155°	160°	165°	170°	175°	180°	185°	190°	195°
30°	12	12¼	12½	12¾	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
32	12½	13	13½	14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
34	13¼	13¾	14½	14¾	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
36	14	14¾	15¼	15½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
38	.....	15½	16¼	16½	16½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
40	.....	16½	17¼	17½	17½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
42	.....	17½	18¼	18½	18½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
44	.....	19	19½	19¾	19¾	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
46	.....	20¼	20¾	21	21	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
48	.....	21¾	22¼	22½	22½	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
50	.....	.....	24	24	24	24	.....	.....	.....	.....	.....	.....	17	16	14	12	.....	.....
52	.....	.....	24¾	25¼	25½	25½	.....	.....	.....	.....	.....	18	17	16	14	12	10	8
54	.....	.....	26¼	27¼	27½	27½	.....	.....	.....	22½	21	20	18	16	14	12	10	8
56	.....	.....	.....	28	28	28	27½	26½	25¼	23¾	21¾	20	18½	17	14	12	10	8
58	.....	.....	.....	.....	31	30¾	29¾	28¾	26½	25½	23	21	19	19	14	13	10	.....
60	.....	.....	.....	.....	.....	34	32	31	29	26	24	21	19	18	15	13	.....	.....
62	.....	.....	.....	.....	.....	38	36	35	33	29	27	24	22	19	16	14	.....	.....
64	.....	.....	.....	.....	.....	.....	.....	.....	.....	32	29	26	23	20	17	.....	.....	.....
66	.....	.....	.....	.....	.....	.....	.....	.....	.....	34	31	28	25	.....	.....	.....	.....	.....
68	.....	.....	.....	.....	.....	.....	.....	.....	.....	37	33	30	27	.....	.....	.....	.....	.....
70	.....	.....	.....	.....	.....	.....	49	46	42	39	35	32	29	.....	.....	.....	.....	.....
72	.....	.....	.....	.....	.....	.....	52	49	45	42	38	34	.....	.....	.....	.....	.....	.....

INDEX.

A.

Page.

Admiralty Head 232
Admiralty Inlet 222, 240
Albion River 92
Alcatraz Island 63
Alden's Shoal 214
Allan Island 210
Allen's Bank 239
Alseya River 128
Anacapa Island 33
Angel Island 65
Angelos Point 188
Anita Rock 64
Apple Tree Cove 235
Arcata. Town of 101
Archipelago de Haro 204–215, 221
Arch Rock, Coast 112
Arch Rock, San Francisco Bay 64
Astoria 154
Astor Point 153
Atos Creek 49

B.

Baaddah Point 185
Bainbridge Island 236
Baker's Bay 154
Balch's Passage 241
Bald Pate 54
Bald Peak 212
Ballast Point 10
Banco Cortes 27
Bank, Constance, Strait Juan de Fuca 204
Bank, Dallas, off Protection Island 193
Bank, Hein, Strait Juan de Fuca 203
Bank, Middle, Strait Juan de Fuca 204
Bank off Point Grenville 173
Bank off Umpquah River, (Hecota) 127
Bank, Partridge, Strait Juan de Fuca 203
Bank, Salmon, Strait Juan de Fuca 204
Bank, Sturgeon, off Fraser River 217
Bar of Humboldt Bay 98, 99
Bar of San Francisco 60, 61
Barnes Island 213
Barros de Zuniga 10, 12
Basalt Point 233
Battery Point 236
Battle Rock 114
Bays:
  Baker's 154
  Beecher 197
  Bellingham 221
  Birch 215
  Bodega 86–88
  Callam 187
  Carmel 45
  Commencement 240
  Cordova 205

B.

Bays: Page.
  Crescent 188
  Crescent City 106, 107
  Duwamish 236, 237
  False 13
  Freshwater 188
  Gray's 154
  Half Moon 53, 54
  Humboldt 98–103
  Koos 121–124
  Lopez 209
  Mendocino 92, 93
  Monterey 46–50
  Mud 217
  Mutiny 233
  Nanaimo 220
  Neéah 184–187
  New Dungeness 190–191
  Nisco 185
  North 170
  Parry 198
  Pedder 198
  Pelican 109
  Quicksand 141
  Royal 200
  San Diego 9–14
  San Francisco 55–75
  San Pedro 15–17
  San Simeon 43–45
  Semiahmoo 216, 217
  Shoalwater 161–166
  Sir Francis Drake's 77
  South 169
  Strawberry 211
  Tillamook 137–140
  Tomales 84, 85
  Trinidad 103–105
  Useless 234
  Winchester 126
  Young's 154
Beecher Bay 197
Beechey Head 196, 197
Begg Rock 33
Belcher's Channel 156
Belle Rock 209, 210
Bellevue Island 205
Bellingham Bay 221, 222
Bellingham Channel 210
Birch Bay 215, 216
Bird Rock, San Francisco Bay 64
Bird Rocks, Rosario Strait 209
Bishop Rocks 27–29
Black Rock 211
Black Mountain 52
Blake Island 238, 239
Blakely Harbor 237, 238
Blakely Island 211

B.

Page.
Blossom Rock 65
Blunt's Island 203
Blunt's Rocks 95
Bodega Bay 86–88
Bodega Head 85, 86
Boulder Reef 212
Brace Point 239
Brackenridge Bluff 170
British Columbia 218
Brotchy Ledge 200
Bucksport 101
Budd or Washington Harbor 192, 193
Budd Inlet 243
Buoys:
Columbia River Bar 150, 151
Gray's Harbor 166, 167
San Francisco Bar 61
Umpquah River Bar 125
Burrows Island 210
Bush Point 233

C.

California. Origin of name 7, 8
Callam Bay 187, 188
Canal de Haro 205–208, 221
Canel River 187
Cape Arago 121
Cape Blanco 116, 117
Cape Bonilla 182
Cape Broughton 154
Cape Church 197
Cape Disappointment 145–147
Cape Falcon 141, 142
Cape False Mendocino 97, 98
Cape Flattery 180, 181
Cape Flattery. Bank near 181, 182
Cape Fortunas, or False Mendocino 97, 98
Cape Foulweather 132, 133
Cape George 193
Cape Gregory 121
Cape Lookout 135, 136
Cape Meares 136, 137
Cape Mendocino 95–97
Cape Orford 116, 117
Cape Perpetua 127, 128
Cape San Martin 44
Cape Sebastian 112
Cape Shoalwater 162
Carmel Bay 45
Carmel River 45
Cascade Head 134, 135
Challam Point 193
Chatham Island 201
Chehalis River 169, 170, 171
Chetko River 111–112
Chinook Point 152–153
Clark Island 213
Climate of Washington Territory 248
Columbia, British 218
Columbia River 143–171
Columbia River, changes in channel 155–160
Columbia River. Entrance to 147–148
Colvos Passage 239, 240
Colvos Rocks 244
Commencement Bay 240
Cone Islands 221
Constance Bank 204
Copalis River 171–172
Coquille River 118–119
Cordova Bay 205–206

C.

Page.
Cortes Bank 27
Cowichin Head 205
Cowlitz River 155, 223
Crescent Bay 188
Crescent City Bay 106, 108
Crescent City Reef 109
Currents:
Admiralty Bay 232
Bottle 116
Canal de Haro 207
Cape Flattery 181
Columbia River 148, 149
Cortes Shoal 28
Destruction Island 176
Golden Gate 62
Gray's Harbor 169
Gulf of Georgia 215
Humboldt Bay 100
Klamath River 105
Koos Bay 122
North of Columbia River 169
North of Nevarro River 92
Point Arena 91
Point Reyes 78
Point Wilson 194
Possession Sound 234
Race Rocks 197
Rosario Strait 208, 210, 211, 212
San Francisco Entrance 62, 68, 69
Santa Barbara Channel 20, 26, 27, 34
Shoalwater Bay 163, 164
Strait Juan de Fuca 182, 183
Cuyler Harbor 37
Cypress Island 211

D.

Dallas Bank 193
Darcy Island 205
Decatur Island 209
Deception Island 209
Deception Pass 209
Declination, Table of east magnetic 254
Deer Lagoon 234
Denis Rock 210
Destruction Island 174
Discovery Island 201
Double Bluff 233
Dragon Rocks 109
Drayton Harbor 216
Duncan Rock 180
Duntze Rock 180
Duwamish Bay 236
Duxbury Point and Reef 75

E.

Eagle Harbor 237, 238
East Point 207
Ediz Hook 188
Eel River 98
El Coxo 124
Eld Island 166
Elk River 116
Ellice, Point 153
El Moro 15, 42
Elwha River 188
Entrance Rock 208
Entrance to Columbia River 147
Esquimault Harbor 198
Estero Americano 86
Estero de Limantour 77

E.

Page.

Eureka. Town of 101
Explanatory remarks 3

F.

False Bay 13
False Dungeness Bay 188
False Klamath River 106
False Mendocino Cape 97, 98
False Tillamook Head 141
Farrallones de los Frayles 79–82
Fauntleroy Cove 239
Fearless Rock 123
Fern Cove 240
Fidalgo Island 209
Fin Rock 117
Fisgard Island 199
Fishing Rocks 90
Flattery Rocks 177
Fog-bells:
  Alcatraz Island 63
  Cape Disappointment 146
  Fort Point 60
  Fraser River 219
  New Dungeness 192
  Point Boneta 57
  Point Concepcion 22
Fog-trumpet, Point Lobos 58
Fog-whistle, South Farrallon 81
Fort Point 59
Fort Ross 88
Fort Vancouver 155
Foulweather Bluff 233
Fox Island 241
Fraser River 218
Freshwater Bay 188

G.

Garry Point 218
General features:
  Admiralty Inlet, Puget Sound, and Hood's Canal 222
  Cape Orford to Cape Disappointment 142, 143
  North of Cape Mendocino 118, 119
  Santa Barbara Channel 24–27
  South of Monterey Bay 43–44
  Strait Juan de Fuca 182–184
Geographical positions. Table of 250–253
Gig Harbor 240
Gihon Bluff 105
Gold Bluff 105
Golden Gate 55, 61
Gordon River 195
Gray's Bay 154
Gay's Harbor 166
Guemes Island 221
Gulf of Georgia 215

H.

Hahainish Harbor 247
Hale's Passage 213
Half-moon Bay 53, 54
Hautboy Island 211
Haven's Anchorage 90
Hazel Point 247
Heceta Bank 127
Hein Bank 203
Henry Island 206
Hood's Canal 244
Hood's Head 244
Humboldt Bay 98

I.

Page.

Illinois River 111
Introductory remarks 3
Islands:
  Alcatraz 63
  Allan 210
  Anacapa 33
  Angel 65
  Bainbridge 236
  Barnes 213
  Bellevue 205
  Blake 238
  Blakely 211
  Blunt's 203
  Burrow's 210
  Chatham 201
  Clark's 213
  Cone 221
  Cypress 211
  Darcey 205
  Decatur 209
  Deception 209
  Destruction 174
  Discovery 201
  Eld 166
  Farallones 79–82
  Fidalgo 209
  Fisgard 199
  Fox 241
  Guemes 221
  Hautboy 211
  Henry 206
  James 210
  Long 165
  Lopez 208
  Los Coronados 6
  Lummi 211
  McNeil 241
  Matia 213
  Minor 202
  Orcas 212
  Patos 207, 213
  Pine 165
  Protection 193
  Round 165
  San Clemente 29
  Sand 152
  San Juan 205
  San Miguel 37
  San Nicolas 32
  Santa Barbara 32
  Santa Barbara Channel 18
  Santa Catalina 30
  Santa Cruz 34
  Santa Rosa 36
  Saturna 207
  Seabeck 247
  Sidney 206
  Sinclair 212
  Skipjack 207
  Smith's 202
  Stuart 206
  Sucia 207
  Tatoosh 178
  The Sisters 213
  Trial 201
  Tumbo 207
  Vancouver 195
  Vashon 239, 240
  Vendovi 221
  Waaddah 184

I.

Page.

Islands:
- Waldron 207
- Whidbey 182, 223–224
- Yerba Buena 65
- Young 210

J.

James Island 210
Java Head 207
Juan de Fuca. Straits of 182–215

K.

Kelpfields in Strait of Juan de Fuca 203
Kilisut Harbor 231
Klamath River 105
Koitlah Point 184
Koos Bay 121
Koos Head 121, 122

L.

Lake Mountains, (Cypress Island) 211
Lake Washington 237
Leadbetter Point 161
Light-houses:
- Admiralty Head, or Red Bluff 232
- Alcatraz Island 63
- Blunt's, or Smith's Island 202
- Cape Disappointment 146
- Cape Gregory 121
- Cape Mendocino 96
- Cape Shoalwater, or Toke Point 162
- Crescent City Bay 108
- Ediz Hook 189
- Esquimalt Harbor 199
- Fort Point 59, 60
- Humboldt Bay 100
- New Dungeness 191
- Point Boneta 56, 57
- Point Concepcion 22
- Point Loma 8, 9
- Point Pinos 46
- Race Rocks 197, 198
- Red Bluff, or Admiralty Head 232
- Santa Barbara 19
- Smith's, or Blunt's Island 202
- South Farallon 80
- Tatoosh Island 179
- Toke Point, or Cape Shoalwater 162

Light-houses authorized by Congress:
- Point Fermin 16
- Point Hueneme 18
- Point Lobos 57

Light-houses recommended:
- Anacapa Island 34
- Cape Orford 117
- Discovery Island 201
- Point Adams 143
- Point Año Nuevo 52
- Point Arena 91
- Point Santa Cruz 51
- San Miguel Island 37
- Santa Cruz Island 35

Lime Point 61
Long Island, Shoalwater Bay 165
Lopez Bay 209
Lopez Island 208
Los Coronados, Mexico 6
Los Angeles. El pueblo de 16
Los Esteros 42

L.

Page.

Low Point 187
Lummi Island 211
Lummi Rock 212

M.

Mad River 104
Magnetic declination. Table of 254
Magnetic declination. Line of equal, 13° 14
- Line of equal, 14° 40
- Line of equal, 15° 50
- Line of equal, 16° 88
- Line of equal, 17° 93
- Line of equal, 18° 109
- Line of equal, 19° 124
- Line of equal, 20° 136
- Line of equal, 21° 171

Magnolia Bluff 237
Marrowstone Point 232
Matia Group 213
Mats-mats Harbor 245
McNeil Island 241
Mendocino Bay 92, 93
Middle Bank, Columbia River 156, 157, 158, 159, 160
Middle Bank, Strait of Juan de Fuca 204
Middle Farallon 81
Mile Rocks 59
Minor Island 202
Mission del Carmelo 45
Mission San Buenaventura 17
Mission San Juan Capistrana 14
Mission San Luis Rey 14
Mission Santa Barbara 19
Monument, Boundary of United States and Mexico 8
Monte de Buchon 42
Monterey Bay 46–50
Mountains:
- Altas, Sierras 45
- Bache 51
- Baker 215, 231
- Baldpate 54
- Black 52
- Blue 78
- Buchon 42
- Chatham 194
- Concepcion, Sierra 20
- Constitution 213
- Douglas 205
- Erie 210
- Lake 211
- Maguire 196
- Montara 54
- Olympus 173
- Palermo 76
- Point Reyes 78
- Rainier 183
- Saddle 163
- San Pedro 15
- Santa Lucia Range 45
- Sierras Atlas 45
- Sierra Concepcion 20
- St. Helen 148, 162
- Table 76

Mountain Ranges:
- Sierra Concepcion 20
- San Francisco, or San Bruno 55
- San Juan 17
- Santa Cruz 55
- Santa Lucia 45

Mud Bay 217
Mutiny Bay 232

N.

Page.
Nanaimo Bay 220
Narrows. The 241
Nasal River 165
Natahat Lagoon 136
Nawuggah River 134, 136
Nechesne River 134, 135
Necomanche River 165
Neéah Bay 184
Nehalem River 140
Nekas River 133, 134
Nestuggah River 134
New Dungeness Bay 190, 191
Newmarket 243
Nisco Bay 185
Nisqually 243
Nodule Point 233
Noonday Rock 82
North Bay 170
North Beach 62
North Farallones 81
North Point 62
Noyon River 92

O.

Oak Cove 233
Observatory Rocks 196
Olympia 243
Orcas Island 212
Oregon. Coast of 111–144
Orford Reef 116, 117
Otter Point 196
Outer Telegraph Station 62
Owen Point 195

P.

Palux River 165
Parry Bay 198
Partridge Bank 203
Patos Islands 207, 213
Peapods 212
Pedder Bay 198
Pelican Bay 109
Pelly Point 218
Piedras Blancas 43
Pillar Point, Half-moon Bay 53
Pillar Point, Strait of Juan de Fuca 187
Pine Island 165
Piscador River 52
Points:
Adams 143
Angelos 188
Año Nuevo 51
Arena 90
Arguello 39
Astor 153
Baaddah 185
Ballast 10
Basalt 233
Battery 236
Bolsa 52
Boneta 56
Brace 239
Brown 166, 168, 169
Bush 233
Carmel 45
Cavallos 66
Challam 193
Chinook 152, 153
Concepcion 22
Conversion 18

P.

Points: Page.
Corral Tierra 52
Cypress 45
Defiance 241
Diablo 61
Disney 207
Dume 17
Duxbury 75
East 207
Edmund 235
Elliott 235
Ellice 153
Felipe 19
Fermin 15
Fort 59
Garry 218
Gorda 94
Grenville 172
Hanson 166–171
Hazel 247
Hudson 225
Hueneme 18
Jefferson 235
Koitlah 184
Lawrence 212
Leadbetter 161
Lobos 57
Loma 8
Los Esteros 42
Low 187
Marrowstone 232
Miramontes 53
Mugu 17
New 170
Nodule 233
No Point 235
North 62
Observatory 188
Otter 196
Owen 195
Partridge 203
Pedernales 39
Pelly 218
Pillar, Half-moon Bay 53
Pillar, Strait Juan de Fuca 187
Pinos 45
Pully 239
Purissima 39
Restoration 237
Reyes 78
Roberts 217
Rocky 104
Sal 39
Salt 90
Sandy 213
San José 62
San Luis 40
San Pedro 54
Santa Cruz 46, 47
Saucelito 66
Sekou 187
Sheringham 196
Slip 187
St. George 108
Sur 45
Tala 244
Termination 246
Toke 162
Tomales 84
Tongue 153, 154
Village 213
Vincenté 16, 17

P.

Points: Page.
Wells 235
West 236
Whitehorn 215
Wilson 194, 225
Young's 153
Port Angeles 188
Port Discovery 193
Port Gamble 245
Port Ludlow 244
Port Madison 235
Port Orchard 235
Port Orford 113
Port San Juan 195
Port Townshend 224
Portland. Town of 155
Possession Sound 234
Presidio of San Francisco 66
Presidio Shoal 63
Prisoners' Harbor 34
Protection Island 193
Puerto Falso 13
Puget Sound 241
Punta de Arena 90
Punta de Corral Tierra 52
Punta de la Bolsa 52
Punta de la Santa Cruz 46, 47
Punta de los Cavallos 66
Punta Gorda 94

Q.

Quartermaster's Harbor 241
Queenhythe Bay 177
Qué-ni-útl 174
Quicksand Bay 141
Quimper Peninsula 195

R.

Race Rocks 197
Rain at San Francisco 71, 72, 73
Rain, Washington Territory 249
Red Bluff, Humboldt Bay 98
Redding Rock 105
Reefs:
Crescent City, (Dragon Rocks) 109
Duxbury 75
Orford 116, 117
Rogue's River 113
West's 207
Restoration Point 237
Rincon 67
Rio del Pajaro 49
Rivers:
Albion 92
Canel 187
Carmel 45
Chehalis 169, 170, 171
Chetko 111–112
Columbia 143–171
Copalis 171–172
Coquille 118–119
Cowlitz 155, 223
Del Pajaro 49
Eel 98
Elk 116
Elwha 188
False Klamath 106
Feather 75
Fraser 218
Gordon 195
Illinois 111

R.

Rivers: Page.
Klamath 105
Lummi 213
Mad 104
Nasal 165
Nawuggah 134, 136
Nechesne 134, 135
Necomanche 165
Nehalem 140
Nekas 133, 134
Nestuggah 134
Noyon 92
Palux 165
Piscador 52
Qué-ni-útl 177
Rogue 112
Russian 89
Sacramento 74, 75
Salinas 48, 49
Salmon 193
San Gregorio 52, 53
Scaget 235
Sikhs 118
Slavianska 89
Smith's 110
Umpquah 124
Walalla 90
Whilapah 164
Willamette 155
Yaquina 128
Rocks:
Anita 64
Arch, northern coast 112
Arch, San Francisco Bay 64
Battle 114
Begg 33
Belle 209, 210
Bird, Rosario Strait 209
Bird, San Francisco Bay 64
Bishop 27–29
Black 211
Blossom 65
Blunt's 95
California coast. Off 83, 84
Colvos 244
Denis 210
Dragon 109
Duncan 180
Duntze 180
Entrance 208
Farallon, between south and middle 79
Fearless 123
Fin 117
Fishing 90
Flattery 177
Lummi 212
Mile 59
Noonday 82
North Farallon. Off 81, 82
Observatory 196
Peapods 212
Piedras Blancas 43
Point Arena. Off 91
Race 197
Redding 105
Sail 186
San Luis Obispo. Off 40, 41
San Miguel. Near 37
Seal 58
Shag 64
Tichenor's 114

R.

Page.
Rocks:
Tillamook Head. Off ... 142
Unit ... 206
Viti ... 212–222
White, (Piedras Blancas) ... 43
Williamson ... 210
Zero ... 205
Rogue River ... 112
Rogue River Reef ... 113
Rosario Strait ... 208–215
Round Island ... 165
Royal Bay ... 200
Russian River ... 89

S.

Sailing directions for San Francisco Bay ... 67–69
Salinas River ... 48, 49
Salmon Bank ... 204
Salt Point Anchorage ... 90
San Buenaventura Mission ... 17
San Clemente. Island of ... 29
San Diego Bay ... 9–14
San Francisco Bar ... 60, 61
San Francisco Bay and Approaches ... 55–75
San Francisco. Statistics ... 71–74
San Gregorio River ... 52, 53
San Juan Capistrano ... 14
San Juan Island ... 205
San Luis Obispo ... 40
San Luis Rey ... 14
San Miguel Island ... 37
San Miguel. Rocks near ... 37
San Nicholas Island ... 32
San Pedro Bay ... 15–17
San Simeon Bay ... 43–45
Sand Island ... 152
Sandy Point ... 213
Santa Barbara Channel. General remarks on islands in ... 24–39
Santa Barbara Channel. Remarks on ... 18
Santa Barbara Harbor ... 18, 19, 20
Santa Barbara. Island of ... 32
Santa Catalina Island ... 30
Santa Cruz Harbor ... 50
Santa Cruz Island ... 34
Santa Cruz Point ... 46, 47
Santa Rosa Island ... 36
Sares Head ... 210
Satchet Head ... 234
Saturna Island ... 207
Scaget River ... 235
Scarborough Hill ... 162
Seabock Island ... 247
Seal Rocks ... 58
Seasons in California ... 71–75
Seattle. The town of ... 237
Sebastian. Cape ... 112
Sekou Point ... 187
Semiahmoo Bay ... 216, 217
Shag Rock ... 64
Shelter Cove ... 93, 94
Sheringham Point ... 196
Shoal Bight ... 209
Shoals:
Alden's ... 214
Barros de Zuniga ... 10, 12
Cortes ... 27
in Strait Juan de Fuca ... 203, 204
off California Coast ... 83, 84
off San Francisco Entrance ... 83, 84
Presidio ... 63, 64

S.

Page.
Shoalwater Bay ... 161–166
Shoalwater Bay. Entrance to ... 163–166
Sidney Island ... 206
Sierra Altas ... 45
Sierra Concepcion ... 20
Sierra de Santa Lucia ... 45
Sikhs River ... 118
Simoom at Santa Barbara ... 21
Sinclair Island ... 212
Sir Francis Drake's Bay ... 77
Sisters. The ... 213
Skipjack Islands ... 207
Slavianska River ... 89
Slip Point ... 187
Smith's Island ... 202
Smith's River ... 110
Sooke Inlet ... 196
South Bay ... 169
South Farallon. Light and fog-whistle ... 79
Statistics. San Francisco ... 71–74
Stearn's Bluff ... 170
Steilacoom ... 241
Strait of Juan de Fuca ... 182
Strawberry Bay ... 211
Striped Peak ... 187, 188
Stuart Island ... 206
Sturgeon Bank ... 217
Submarine Valley in Monterey Bay ... 49
Submarine Valley off Point Hueneme ... 18
Sucia Group ... 207
Suquamish Harbor ... 246

T.

Table Bluff ... 101
Table Mountain ... 76
Tala Point ... 244
Tatoosh Island ... 178
Teekalet ... 246
Telegraph Hill ... 62
Temperature, California ... 73
Termination Point ... 246
Tichenor's Rock ... 114
Tides at Astoria ... 151, 152
Tides at Bodega Bay ... 88
Tides at Cape Disappointment ... 148
Tides at Columbia River ... 151
Tides at Coquille River ... 119
Tides at Crescent City Bay ... 107
Tides at Cuyler's ... 38
Tides at Humboldt Bay ... 100
Tides at Koos Bay ... 123
Tides at Monterey Bay ... 48
Tides at Neéah Bay ... 185, 186
Tides at New Dungeness ... 192
Tides at Olympia ... 243
Tides at Port Orford ... 115
Tides at Port Townsend ... 225–230
Tides at Restoration Point ... 238
Tides at San Diego Bay ... 11
Tides at San Francisco Bar ... 60
Tides at San Francisco Bay ... 70, 71
Tides at San Luis Obispo Bay ... 41
Tides at San Miguel, Cuyler Harbor ... 38
Tides at San Pedro Bay ... 16
Tides at Santa Cruz Harbor ... 51
Tides at Semiahmoo Bay ... 216, 217
Tides at South Farallon ... 80
Tides at Steilacoom ... 242
Tides at Tillamook Bay ... 139
Tillamook Bay ... 137, 138

T.

Page.
Tillamook Head..... 141, 142
Timber Cove..... 90
Tomales Bay and Point..... 84, 85
Tongue Point..... 153, 154
Trial Islands..... 201
Trinidad Bay and Head..... 103-104
Tumbo Island..... 207

U.

Umpquah River..... 124
Unit Rock..... 206
Useless Bay..... 234

V.

Vancouver Island..... 195
Vashon Island..... 239, 240
Vendovi Island..... 221
Victoria Harbor..... 200
Village Point..... 213
Viti Rocks..... 212, 222

W.

Waaddah Island..... 184
Walallah River..... 90
Waldron Island..... 207

W.

Page.
Washington Harbor..... 192
Washington Sound..... 204, 205
Washington Territory. Coast and Shore of..... 145-248
Watmough Head..... 208
West Point..... 236
West Reef..... 207
Whidbey Island..... 182, 223-224
Whilapah River..... 164
White Rocks, (Piedras Blancas)..... 43
Willamette River..... 155
Williamson Rocks..... 210
Winchester Bay..... 126
Winds on Pacific Coast..... 69, 70
Wreck..... 64

Y.

Yaquina River..... 128-132
Yerba Buena Island..... 65
Young's Bay..... 154
Young Island..... 210
Young's Point..... 153

Z.

Zero Rock..... 205

O