



San Francisco Bay, California

Chart 18640

- (1) **San Francisco Bay**, the largest harbor on the Pacific coast of the United States, is more properly described as a series of connecting bays and harbors of which San Francisco Bay proper, San Pablo Bay, and Suisun Bay are the largest. Depths of 29 to 40 feet are available for deep-draft vessels to San Francisco, Oakland, Alameda, Richmond, and Redwood City in San Francisco Bay proper; to Stockton on the San Joaquin River; and to Sacramento through the lower Sacramento River and a deepwater channel. Much of the local navigation is by light-draft vessels and barges.
- (2) The extensive foreign and domestic commerce of San Francisco Bay is handled through the several large ports which are the terminals for many trans-pacific steamship lines, airlines, and transcontinental railroads.
- (3) The E shore of San Francisco Bay proper is low except for rolling grassy hills in the N part and extensive marshes intersected by numerous winding sloughs in the S part. The W shore N of the entrance is much bolder than the E shore where there are only a few stretches of low marsh. Below San Francisco, marshes and flats intersected by numerous sloughs extend to the S end of the bay.
- (4) The Coast Guard Captain of the Port, San Francisco, has ordered that all ships greater than 300 gross tons, anchored in San Francisco Bay maintain a radio listening watch on VHF-FM channels 13 and 14 when the wind is 25 knots or greater. Any ship not equipped with channel 13 shall maintain a listening watch on VHF-FM channel 16. This radio watch must be maintained by a person who can speak the English language.
- (5) The Coast Guard considers the following areas to be narrow channels or fairways for the purpose of enforcing the International and Inland Rules of the Road:
- (6) a. All traffic lanes and precautionary areas in the San Francisco Bay eastward of the San Francisco Approach Lighted Whistle Buoy SF to the San Francisco-Oakland Bay Bridge and the Richmond-San Rafael Bridge.
- (7) b. Oakland Harbor Bar Channel including the Outer Harbor Entrance Channel and the Inner Harbor Entrance Channel.
- (8) c. Oakland Outer Harbor.
- (9) d. Oakland Inner Harbor from Inner Harbor Channel Light 7 to, and including, the Brooklyn Basin South Channel.
- (10) e. Alameda Naval Air Station Channel in its entirety.
- (11) f. South San Francisco Bay Channels between the central Bay Precautionary Area and Redwood Creek Entrance Light 2.
- (12) g. Redwood Creek between Redwood Creek Entrance Light 2 and Redwood Creek Light 21.
- (13) h. San Pablo Straight Channel from the Richmond-San Rafael Bridge to San Pablo Bay Channel Buoy 7.
- (14) i. Pinole Shoal Channel in San Pablo Bay between San Pablo Bay Channel Buoy 7 and San Pablo Bay Channel Light 14.
- (15) j. Carquinez Strait between San Pablo Bay Channel Light 14 and the Benicia-Martinez Highway Bridge.
- (16) k. Mare Island Strait between Mare Island Strait Light 2 and Mare Island Causeway Bridge.
- (17) l. Suisun Bay Channels between the Benicia-Martinez Highway Bridge and Suisun Bay Light 34.
- (18) m. New York Slough between Suisun Bay Buoy 30 and San Joaquin River Light 2.
- (19) n. Sacramento River Deep Water Ship Channel from Suisun Bay Light 34 to the Port of Sacramento.
- (20) o. San Joaquin River from San Joaquin River Light 2 to the Port of Stockton.
- (21) The above listing of narrow channel or fairway areas is not intended to be exhaustive. Rather it identifies deep-draft navigation areas where commercial and public vessels routinely operate and where small craft can impede the safe transit of larger vessels if extreme care is not exercised. Narrow Channels, Inland-Navigation Rule 9, applies.

COLREGS Demarcation Lines

- (22) The lines established for San Francisco Bay are described in **80.1142**, chapter 2.

Chart 18645

- (23) The entrance to San Francisco Bay is through **Gulf of the Farallones** and the narrow Golden Gate. The gulf extends from Point San Pedro on the S for 34 miles to Point Reyes on the N, and has a greatest width of 23 miles from Farallon Islands on the W to the mainland.
- (24) In clear weather many prominent features are available for use in making San Francisco Bay, but in thick weather the heavy traffic and the currents, variable in direction and velocity, render the approaches difficult and dangerous. Point San Pedro, Montara Mountain, Farallon Islands, Mount Tamalpais, and Point Reyes

are prominent in clear weather and frequently can be seen when the land near the beach is shut in by low fog or haze. Radar navigation on the approach to San Francisco Bay is not difficult because of the numerous distinctive and high relief of targets available. Southeast Farallon Island, Point Reyes, Double Point, Bolinas Point, Duxbury Point, Rocky Point, Point Bonita, San Pedro Rock and Point, and Pillar Point are good radar targets.

(25) The first 8 miles of coast from Point San Pedro to San Francisco Bay entrance consists of whitish bluffs that reach a height of 600 feet, then a 3-mile sand beach extends to the entrance. **Shelter Cove**, on the N side of Point San Pedro, provides shelter from the E storms with good holding ground in gray sand bottom. **San Pedro Rock**, close to the point and 100 feet high, also gives some protection in S weather.

(26) The **Gulf of the Farallones National Marine Sanctuary** has been established to protect and preserve the marine birds and mammals, their habitats, and other natural resources in the waters surrounding the Farallon Islands and Point Reyes, and to ensure the continued availability of the area as a research and recreational resource. The sanctuary encompasses the waters off Bodega Head and Point Reyes, and the waters surrounding Farallon Islands. The sanctuary includes Bodega Bay but not Bodega Harbor. Recreational use of the area is encouraged. (See **15 CFR 922**, chapter 2, for limits and regulations.)

(27) **Farallon Islands**, 23 miles W of San Francisco Bay entrance, are rocky islets extending NW for 7 miles. **Southeast Farallon**, the largest of the group, actually consists of two islands separated by a narrow impassable gorge. The larger E island is pyramidal in shape and 350 feet high; a small-boat landing is on the S side. **Farallon Light** (37°41'57"N., 123°00'07"W.), 358 feet above the water, is shown from a white conical tower on the highest peak of the island. Dwellings are on the lowland on the S side of the island. **Fisherman Bay**, just N of Farallon Light, is somewhat protected by several rocky islets on the W side and affords anchorage in 8 fathoms in the outer part. Boats can be landed on a small sand beach on the largest islet.

(28) **Hurst Shoal**, 0.6 mile SE of Farallon Light, is covered 22 feet and breaks only in heavy weather.

(29) **Middle Farallon**, 2.3 miles NW of the light, is a 20-foot single black rock 50 yards in diameter; several rocks covered 5 to 7 fathoms are within 0.7 mile S and SW of it.

(30) **North Farallon**, 6.5 miles NW of Farallon Light, consists of two clusters of bare precipitous islets and rocks from 91 to 155 feet high, 0.9 mile in extent, and 0.3 mile wide; submerged rocks surround them.

(31) **Fanny Shoal**, 9.8 miles NW of Farallon Light and 14 miles SW of Point Reyes, is 2 miles in extent and covered 2 to 30 fathoms. **Noonday Rock**, covered 3 1/4 fathom, rises abruptly from 20 fathoms and is the shallowest point of the shoal; it is the principal danger in the

N approach to San Francisco Bay. A lighted bell buoy is about 0.7 mile W of the rock. Noonday Rock derives its name from the clipper ship that struck it in 1862 and sank within an hour, in 40 fathoms.

(32) **Cordell Bank**, 27 miles NW of Farallon Light and 20 miles W of Point Reyes, is about 6 miles long and 3 miles wide; the bank is covered 20 to 40 fathoms, but depths increase rapidly outside it.

(33) The **Cordell Bank National Marine Sanctuary** has been established to protect and conserve the special, discrete, highly productive marine area of Cordell Bank and its surrounding waters and to ensure the continued availability of the areas ecological, research, educational, aesthetic, historical, and recreational resources. (See **15 CFR 922**, chapter 2, for limits and regulations.)

Chart 18647

(34) **Point Reyes**, 18 miles N of Farallon Light, is a bold, dark, rocky headland 612 feet high at the W and higher extremity of a ridge running in an E direction for 3 miles. It is an excellent radar target in thick weather. There is lowland N of the point, so that from N and S, and from seaward in hazy weather, it usually appears as an island. The point is visible for over 25 miles.

(35) **Point Reyes Light** (37°59'44"N., 123°01'23"W.), 265 feet above the water, is shown from a platform on top of a square building on the W extremity of the point. A sound signal is at the light. Two rocks, 275 yards W of the light, are covered about 3 feet and break in a moderate swell.

(36) **Drakes Bay**, named after English explorer Sir Francis Drake, who anchored here in 1579, is NE of the 1-mile-long 200-foot-high, narrow peninsula that forms the easternmost part of Point Reyes. White cliffs commence at the SW angle of the bay and curve round to the NE for about 6 miles, ending at high white sand dunes. This curving shoreline forms Drakes Bay, which affords good anchorage in depths of 4 to 6 fathoms, sandy bottom, in heavy NW weather. Several lagoons back of the N shore empty into the bay through a common channel which is navigable by shallow-draft vessels with local knowledge.

(37) **Chimney Rock** lies close under the outer end of the Drakes Bay peninsula. The area between Chimney Rock and the 5-fathom curve, 0.4 mile E and SE, breaks in moderate weather. A lighted whistle buoy is moored 0.6 mile SE of the rock.

(38) Drakes Bay is used extensively in heavy NW weather and many fishing vessels operate from here during the season. A fish wharf is about midway along the inner side of the peninsula. A visible wreck is about 100 feet E of the fish wharf in about 37°59'41"N., 122°58'19"W. Visible and submerged piles W of the fish wharf are a hazard.

(39) From the sand dunes near the E part of Drakes Bay, cliffs 100 to 200 feet high extend 5 miles SE to **Double**

Point, which has two high spurs, 0.4 mile apart, projecting 200 to 300 yards from the general coastline. A small 47-foot-high island is 300 yards off the NW spur, and a 54-foot-high rock is close under the longer and lower SE spur. From Double Point to Bolinas Point, about 3.5 miles SE, the coast is bold with high cliffs behind narrow sand beaches.

(40) **Bolinas Point**, 15.3 miles SE of Point Reyes Light, is 160 feet high and the W extremity of the comparatively level tableland extending E to Bolinas Lagoon. An aerolight and numerous radio towers are 0.6 mile N of the point.

(41) **Duxbury Point**, 16.5 miles SE of Point Reyes Light, is 160 feet high and yellow in color. The point is the S edge of the tableland W of Bolinas Lagoon.

(42) **Duxbury Reef**, extending 1.2 miles SE of Duxbury Point, is long, narrow, and partly bare at low water. A ledge covered 9 to 36 feet extends from the reef to about 1.4 miles S of the point; a lighted whistle buoy is about 2 miles S of the point. Great care must be exercised in passing this area.

Warning

(43) It was reported that in heavy weather strong N currents resulting from prolonged S winds may exist in the area from Duxbury Reef to Golden Gate.

Charts 18645, 18649

(44) **Bolinas Bay**, E of Duxbury Point, is an open bight 3.5 miles wide between Duxbury Point and Rocky Point. The bay affords shelter in NW weather in 24 to 36 feet, sandy bottom. Care must be taken to avoid Duxbury Reef and the dangers extending up to 0.7 mile E of it. **Bolinas Lagoon** is separated from the bay by a narrow strip of sandy beach that is cut by a narrow shifting channel. The lagoon is shoal and entered only by small boats with local knowledge. The entrance has a depth of less than 3 feet.

(45) **Rocky Point** is 100 feet high and shelving. Numerous detached rocks are within 200 yards of the high and precipitous cliffs on the S side of the point.

(46) The 6-mile coast between Rocky Point and Point Bonita is very rugged and broken. The cliffs, which are seaward ends of spurs from Mount Tamalpais, rise to heights of over 500 feet and are cut by deep narrow valleys stretching inland.

(47) **Point Bonita**, on the N side of the entrance to Golden Gate, is a sharp black cliff 100 feet high, increasing to 300 feet on its seaward face, 0.3 mile N. From NW it shows as three heads. **Point Bonita Light** (37°48'56"N., 122°31'46"W.), 124 feet above the water, is shown from a 33-foot white tower on the S head. A sound signal is at the light. A tower and radar antenna operated by the San Francisco Vessel Traffic Service is prominent on the N head about 0.3 mile from the light. In summer the cliffs are white with bird droppings, but the first heavy

rain restores them to their natural black color. There are a few detached rocks surrounding the point, but these do not extend over 200 yards offshore.

(48) **Bonita Cove**, E of Point Bonita, is occasionally used as an anchorage by small vessels. The anchorage is close under Point Bonita in about 36 feet.

(49) **Mount Tamalpais**, 7 miles N of Point Bonita, is visible for over 60 miles in clear weather. From S and W it shows three summits, the westernmost with two radar domes is the highest and the easternmost with a lookout tower is the sharpest. The mountain is covered with bushes and scrub trees, giving it a dark appearance which contrasts strongly with the surrounding hills, especially in summer when the hills assume a light reddish color.

(50) **San Francisco Approach Lighted Whistle Buoy SF** (37°45'00"N., 122°41'34"W.) is 9 miles WSW of San Francisco Bay entrance. The buoy is red and white and is equipped with a racon.

(51) **San Francisco Bar**, a semicircular shoal with depths less than 36 feet, is formed by silt deposits carried to the ocean by the Sacramento and San Joaquin River systems. The bar extends from 3 miles S of Point Lobos to within 0.5 mile of Point Bonita off the southern coast of Marin Peninsula; the extreme outer part is about 5 miles WSW of San Francisco Bay entrance. **Potatopatch Shoal**, the N part of the bar on **Fourfathom Bank**, has depths from 24 to 28 feet.

Warning

(52) Very dangerous conditions develop over the bar whenever large swells, generated by storms far out at sea, reach the coast. A natural condition called shoaling causes the large swells to be amplified and increase in height when they move over the shallow water shoals. This piling up of the water over the shoals is worsened during times when the tidal current is flowing out (ebbing) through the Golden Gate. Outbound tidal current is strongest about 4 hours after high water at the Golden Gate Bridge and attains a velocity in excess of 6 knots at times. The incoming large swells are met by outbound tidal current causing very rough and dangerous conditions over the bar. Steep waves to 20 or 25 feet have been reported in the area. Mariners should exercise extreme caution as the bar conditions may change considerably in a relatively short period of time.

(53) **The most dangerous part of the San Francisco Bar is considered to be Fourfathom Bank. Bonita Channel, between the shoal and the Marin coast, can also become very dangerous during large swell conditions. The safest part of the bar is the Main Ship Channel through the center of the bar. But even that area can be extremely dangerous when the tidal current is ebbing.**

(54) **Golden Gate**, the passage between the ocean and San Francisco Bay, is 2 miles wide at the W end between Point Bonita and Point Lobos, but the channel is reduced in width to 1.5 miles by Mile Rocks and to less than 0.7 mile by the Golden Gate Bridge pier. Depths in



the passage vary from 108 feet to over 300 feet.

(55) **Point Lobos**, the S entrance point to the Golden Gate, is high, rocky, and rounding with black rugged cliffs at its base. A large water tank is on the summit. The **Cliff House** is near the S part of the W face of the point; high and rocky **Seal Rocks** are just offshore.

(56) **Mile Rocks**, 700 yards NW of the sharp projecting point off **Lands End** on the N face of Point Lobos, are two small 20-foot-high black rocks about 100 feet apart. **Mile Rocks Light** (37°47'34"N., 122°30'37"W.), 49 feet above the water, is shown from an orange and white horizontally banded tower on the outer and larger rock; a sound signal is at the light.

(57) Passage between Mile Rocks and Point Lobos should not be attempted because of the covered and visible rocks extending over 300 yards from shore and the rocks covered 6 and 14 feet S of Mile Rocks Light.

(58) The S shore of the Golden Gate extends in a gentle curve NE for 2 miles to Fort Point, forming a shallow bight called **South Bay**. The cliffs rise abruptly from narrow beaches, except near the middle of the bight where a valley terminates in a sand beach 0.3 mile long. Sailing craft are sometimes obliged to anchor here when becalmed, or when meeting an ebb current, to avoid drifting onto Mile Rocks, but the anchorage is uncomfortable and it is difficult to get underway from it.

(59) **Fort Point** projects slightly from the high cliffs and is marked by a square red brick fort with a stone seawall in front. The fort, which is obscured by the S end of the Golden Gate Bridge, and 29 acres of land adjacent to the fort are part of the Fort Point National Historic Site. The fishing wharf at Fort Point is unsafe for mooring because of surge conditions.

(60) The N shore of the Golden Gate is bold and rugged, with reddish cliffs rising abruptly from the water's edge to over 600 feet.

(61) **Point Diablo**, 1.4 miles E of Point Bonita, rises abruptly from a 0.1-mile sharp projection to a height of over 200 feet with deep water on all sides. A light is shown from a white house on the end of the point; a sound signal is at the light.

(62) The mile-long shore between Point Diablo and Lime Point forms a shallow bight with steep cliffs. Near the middle of the bight the cliffs are cut by a narrow valley which ends in a low beach at the shore.

(63) **Lime Point**, 2.5 miles E of Point Bonita, is high and precipitous, and rises abruptly to a height of nearly 500 feet in less than 0.3 mile. A light is shown from a pole at the end of the point.

(64) **Golden Gate Bridge**, crossing the Golden Gate from Fort Point to Lime Point, has a clearance of 225 feet at the center of the 4,028-foot-wide channel span between the 740-foot-high supporting towers; the least clearance of 211 feet at the S pier. Two scaffolds located in the main navigation channel span and one scaffold

in the southern span reduce vertical clearance by approx 12 feet and are lighted at night with red lights. The Golden Gate Bridge District will move the scaffolding upon 48 hours advance notice for the passage of vessels. Scaffolding is moved to the piers when not in use. Mariners should contact the Golden Gate Bridge at 415-923-2230. The center of the span is marked by a fixed green light with three fixed white lights in a vertical line above it and by a private sound signal and racon; a private light and sound signals are on the S pier. When approaching Golden Gate Bridge in the eastbound traffic lane in fog, channel Buoy 2 sometimes provides a radar image that indicates the location of the S pier of the bridge. Aero obstruction lights mark the tops of the bridge towers.

Traffic Separation Scheme

(65) **Traffic Separation Scheme San Francisco** has been established off the entrance to San Francisco Bay. (See chart 18645.) The scheme is composed of **directed traffic areas** each with one-way inbound and outbound **traffic lanes** separated by defined **separation zones**; a **precautionary area**; and a **pilot boat cruising area**. The Scheme is recommended for use by vessels approaching or departing San Francisco Bay, but is not necessarily intended for tugs, tows, or other small vessels which traditionally operate outside of the usual steamer lanes or close inshore.

(66) **The Traffic Separation Scheme has been designed to aid in the prevention of collisions at the approaches to major harbors, but is not intended in any way to supersede or alter the applicable Navigation Rules. Separation zones are intended to separate inbound and outbound traffic lanes and to be free of ship traffic, and should not be used except for crossing purposes. Mariners should use extreme caution when crossing traffic lanes and separation zones.** (See **167.1 through 167.15** and **167.400 through 167.451**, chapter 2, for limits and regulations and Traffic Separation Schemes, chapter 1, for additional information.)

(67) When not calling at San Francisco mariners are urged to sail direct between Point Arguello and Point Arena so as to pass the San Francisco Bay area to the W of the Farallon Islands and clear of the San Francisco Traffic Separation Scheme. In this manner through coastwise traffic will avoid crossing the directed traffic areas and/or precautionary area.

(68) The **precautionary area** off the entrance to San Francisco Bay is inscribed by a circle with a radius of 6 miles centered on San Francisco Approach Lighted Whistle Buoy SF (37°45'00"N., 122°41'34"W.) with the traffic lanes fanning out from its periphery. The W half of the circle has depths of 15 to 30 fathoms, the E half has lesser depths of 4 to 21 fathoms. Extreme caution must be exercised in navigating within the precautionary area inasmuch as both incoming and outgoing vessels use the area in making the transition between San Francisco Main Ship Channel and one of the established

directed traffic areas as well as maneuvering to embark and disembark pilots. It is recommended that all vessels in the precautionary area guard VHF-FM channels 13 and 14.

(69) A circular area to be avoided, with a 0.5 mile radius centered on the San Francisco Approach Lighted Whistle Buoy SF, has been established in the precautionary area of the San Francisco Traffic Separation Scheme. This zone has been established for the protection of the lighted whistle buoy.

(70) Mariners are cautioned that San Francisco Approach Lighted Whistle Buoy SF cannot be safely used as a leading mark to be passed close aboard, and are requested to stay outside that area.

(71) The **pilot boat cruising area** is about 1 mile NE of the San Francisco Approach Lighted Whistle Buoy SF. (See pilotage for San Francisco Bay, this chapter.)

Northern Traffic Lanes:

Traffic Lane, Inbound

(72) The N approach to San Francisco is between Point Reyes and the Farallon Islands through the N inbound traffic lane that tapers from 1.7 miles to 1 mile wide in its length of about 15.4 miles. Entering the traffic lane at a point in about 37°55.0'N., 123°05.2'W., a course of **120°** follows the centerline of the traffic lane to the junction with the precautionary area; thence an ESE course for about 7 miles leads to the pilot boat cruising area. The least known depth in the traffic lane is 29 fathoms.

Traffic Lane, Outbound

(73) The N exit from San Francisco Bay by outbound vessels is 6 miles, 312° from the San Francisco Approach Lighted Whistle Buoy SF through the N outbound traffic lane that expands from 1 mile to 1.7 miles wide in its length of about 15.4 miles. A course of **305°** follows the centerline of the traffic lane to its end; thence steer usual courses to destination. Least known depth in the traffic lane is 25 fathoms.

Separation Zone

(74) The N separation zone between the inbound and outbound traffic lanes tapers from 1.7 miles wide at its outer end to 1 mile wide at its junction with the precautionary area and is centered on a line bearing **302½°** and passing through San Francisco Approach Lighted Whistle Buoy SF and San Francisco Northern Traffic Lane Lighted Bell Buoy N (37°48'00"N., 122°47'55"W.).

Western Traffic Lanes:

Traffic Lane, Inbound

(75) The SW approach to San Francisco Bay is SE of the Southeast Farallon Island through the main inbound traffic lane which tapers from 1.7 miles to 1 mile wide

in its length of about 9.4 miles. Entering at a point in about 37°35.8'N., 122°56.9'W., a course of **058½°** follows the centerline of the traffic lane to the junction with the precautionary area; thence a NE course for about 6.7 miles leads to the pilot boat cruising area. The least known depth in the traffic lane is 28 fathoms, except for the charted wreck 6.7 miles **226°** from San Francisco Approach Lighted Whistle Buoy SF which has a minimum depth of at least 9½ fathoms.

Traffic Lane, Outbound

- (76) The SW exit from San Francisco Bay by outbound vessels is 6 miles, **244°** from the San Francisco Approach Lighted Whistle Buoy SF through the main outbound traffic lane that expands from 1 mile to 1.7 miles wide in its length of about 8.8 miles. A course of **247°** follows the centerline of the traffic lane to its end; thence steer usual courses to destination. The least known depth in the traffic lane is 27 fathoms.

Separation Zone

- (77) The main separation zone between the inbound and outbound traffic lanes tapers from 1.7 miles wide at its outer end to 1 mile wide at its junction with the precautionary area and is centered on a line bearing **242½°** from San Francisco Main Traffic Lane Lighted Gong Buoy W (37°41'28"N., 122°47'40"W.).

Southern Traffic Lanes:

Traffic Lane, Inbound

- (78) The S approach to San Francisco Bay is through the 1-mile wide Southern Traffic Lane (Inbound) that has a length of about 12 miles. Entering at a point in about 37°27.0'N., 122°39.5'W., a **000°** course follows the centerline of the traffic lane to the junction with the precautionary area; thence a NNW course for about 6 miles leads to the pilot boat cruising area. Least known depth in the traffic lane is about 21 fathoms.

Traffic Lane, Outbound

- (79) The S exit from San Francisco Bay for outbound vessels is about 6 miles **195°** from the San Francisco Approach Lighted Whistle Buoy SF through the 1-mile wide Southern Traffic Lane (Outbound) that has a length of about 12 miles. A course of **180°** follows the centerline of the traffic lane to its end. Least known depth in the traffic lane is about 25 fathoms.

Separation Zone

- (80) The S separation zone between the inbound and outbound traffic lanes is about 2 miles wide and 12 miles long, centered on a line bearing **000°** from San Francisco South Traffic Lane Lighted Bell Buoy S (37°39'00"N., 122°41'42"W.).

- (81) An additional **Traffic Separation Scheme** has been established through the Main Ship Channel and Golden

Gate into San Francisco Bay. The scheme consists of one-way **traffic lanes** separated by a **separation line** and, after entry into San Francisco Bay, includes a **precautionary area**, a **regulated navigation area**, and **recreation areas**. For purposes of INTERNATIONAL NAVIGATION Rule 10, this scheme has been adopted by IMO seaward of the demarcation line. (See Traffic Separation Schemes, chapter 1, for additional information).

Vessel Traffic Service

- (82) **Vessel Traffic Service San Francisco** serves San Francisco Bay, its seaward approaches and its tributaries as far inland as Stockton and Sacramento. Participation is mandatory for certain vessels within navigable waters of the United States. (See **161.1 through 161.23 and 161.50**, chapter 2, for limits and regulations.)

- (83) The purpose of the San Francisco Vessel Traffic Service (VTS) is to coordinate the safe, secure, and efficient transit of vessels in San Francisco Bay including its approaches and tributaries in an effort to prevent accidents with the possible associated loss of life, damage to property and the environment. VTS also fully supports Coast Guard and other public service missions through its unique communications and surveillance capabilities. The Vessel Traffic Center (VTC), located on Yerba Buena Island in San Francisco, is staffed 24 hours a day, seven days a week by Coast Guard personnel.

- (84) The VTS uses radar, closed-circuit television and VHF-FM radiotelephone to gather information, and uses VHF-FM radiotelephone to disseminate information. Information provided by the VTS is mostly generated from vessel reports; this information can therefore be no more accurate than the reports received from mariners coupled with the ability of VTS equipment to verify those reports. The VTS may not have first hand knowledge of hazardous circumstances existing in the VTS area. Unreported hazards may still confront mariners at any time. This service does not in any way supersede or alter applicable Navigation Rules. The owner, operator, charterer, master, or person directing the movement of the vessel remains at all times responsible for the manner in which the vessel is operated and maneuvered, and is responsible for the safe navigation of the vessel under all circumstances.

- (85) The VTS maintains a continuous radiotelephone watch on VHF-FM channels 12, 13, 14, and 16. The VTS is also equipped to communicate on all VHF-FM radiotelephone channels. The radio call sign is "San Francisco Traffic Service." After communications have been established, the abbreviated call sign "Traffic" may be used. Mariners may also contact VTS by cellular or land-line telephone at 415-556-2760.

- (86) The VTS area is divided into two sectors: offshore and inshore. The **Offshore Sector** consists of the ocean waters within a 38 nautical mile radius of Mount Tamalpais (37°55.8'N., 122°34.6'W.) excluding the San Francisco Offshore Precautionary Area. (The San Francisco Offshore Precautionary Area is the area within a six-mile

radius of the San Francisco Approach Lighted Whistle Buoy SF.) Channel 12 VHF-FM is the designated working frequency for the Offshore Sector. At minute 15 and minute 45 of each hour, VTS makes broadcasts giving the positions, courses, and speeds of participating vessels in the sector.

- (87) The **Inshore Sector** consists of the waters of the San Francisco Offshore Precautionary Area eastward to San Francisco Bay and its tributaries extending inland to the ports of Stockton, Sacramento, and Redwood City. VHF-FM Channel 14 is the designated working frequency for the Inshore Sector.

Reporting points for the San Francisco VTS area are as follows:

Offshore Sector Procedures

Initial Check-in and Sailing Plan Report

- (88) The Offshore Sector area is formally defined as the ocean waters within a 38 nautical mile radius of Mount Tamalpais (37°55.8'N., 122°34.6'W.) excluding the San Francisco Offshore Precautionary Area (the area within a six mile radius of the San Francisco Sea Buoy).
- (89) This translates roughly to an arc starting at the shoreline near Bodega Head, crossing Cordell Bank, then circling southward to pass about 30 nautical miles W of the San Francisco Sea Buoy, and curving eastward to the shoreline near Pescadero Point (see charts 18640 and 18680).
- (90) The eastern boundary of the Offshore Sector is a line from Duxbury Point due S to the boundary of San Francisco Offshore Precautionary Area, then following the boundary of the Precautionary Area past the "N" "W" and "S" buoys, and then due E to Mussel Rock.
- (91) When approaching from sea, check in with VTS 15 minutes from the outer boundary on VHF-FM channel 12 and report your Sailing Plan.

Sailing Plan

- (92) Give the following information in your Sailing Plan:
- (93) Vessel name
- (94) Vessel type
- (95) Position; latitude and longitude (if unable to provide coordinates then provide your bearing and range from the San Francisco Sea Buoy)
- (96) ETA at next reporting point
- (97) ETA at the San Francisco Sea Buoy (if inbound) or the outermost reporting point on your route (if outbound or transiting across the Offshore Sector)

Sailing Plan Amplification Reports

- (98) When your vessel is at the next reporting point, call VTS. Give the following information:
- (99) Vessel name and position of the Offshore reporting point you are passing

- (100) Vessel's course and speed
- (101) ETA at the San Francisco Sea Buoy if you are inbound
- (102) ETA to the outermost reporting point if you are outbound

Other reports

- (103) When conducting research, engaged in naval exercises, or conducting other special operations in the Offshore Sector, report your Sailing Plan to VTS and include the nature of your operation. Report any emergency on board your vessel or other vessels to VTS immediately.
- (104) When you are engaged in fishing you may report this fact to VTS. However, you are not required to do so unless your vessel fits into one of the categories as described in **161.2**, chapter 2 of this Coast Pilot.

Transiting across the offshore sector

- (105) When you are transiting across the Offshore Sector and will not enter the San Francisco Offshore Precautionary Area, call VTS on VHF-FM channel 12 and report your Sailing Plan when you reach the first Offshore Sector reporting point on your route. (See below list of reporting points in the Offshore Sector).

Offshore vessel traffic advisories

- (106) VTS broadcasts the positions, courses, speeds, and estimated times of arrivals at reporting points of all VTS users who have reported to VTS in the Offshore Sector. VTS makes these advisories at minute 15 and minute 45 each hour. VTS strongly recommends that vessels in the area of the Offshore Sector listen to these broadcasts.

Offshore Reporting Point Inbound

North

- (107) Bodega Head or Cordell Bank;
- (108) Point Reyes (or entering the Traffic Separation Scheme);
- (109) "N" Buoy or Duxbury Reef Buoy.

West

- (110) Approximately 30 nautical miles from the San Francisco Sea Buoy or at longitude 123°20'W.;
- (111) Southeast Farallon Island (entering the Traffic Separation Scheme);
- (112) "W" Buoy.

South

- (113) Pescadero Point or approximately 30 nautical miles from the San Francisco Sea Buoy or at latitude 37°15'N.;
- (114) Pillar Point (entering the Traffic Separation Scheme);
- (115) "S" Buoy or Mussel Rocks.

Inshore Sector:

- (116) • Pilot Area/Point of Entry into VTS area
- (117) • San Mateo Bridge
- (118) • Redwood Creek Entrance Light 2
- (119) • Dumbarton Bridge
- (120) • Richmond-San Rafael Bridge
- (121) • “E” buoy in San Pablo Bay
- (122) • Petaluma Channel Daybeacon 19
- (123) • Mare Island Strait Lighted Buoy 1
- (124) • Mare Island Causeway Bridge (when inbound/
outbound Mare Island Strait)
- (125) • Carquinez Bridge
- (126) • Military Ocean Terminal Concord (MOTCO)
- (127) • New York Point
- (128) • Antioch Bridge
- (129) • Prisoners Point
- (130) • Rio Vista Bridge
- (131) • Sacramento Deep Water Channel Lights 51 and
65
- (132) • when secured at the destination or when depart-
ing the VTS area
- (133) For detailed information about the VTS, go to
<http://www.uscg.mil/d11/vtssf>. The site contains links
to the Users Manual, Communications Guide, Regu-
lated Navigation Areas, and other information particu-
larly useful to commercial and recreational mariners.
Vessels operating within the VTS Area defined as VTS
Users are reminded of the requirement to carry a copy
of the National VTS Regulations aboard their vessel and
are recommended to carry a copy of the San Francisco
VTS User’s Manual.

Routes

- (134) The routes for approaching San Francisco Bay are
described in chapter 3 and at the beginning of this chap-
ter under San Francisco Traffic Separation Scheme.
- (135) Taking care to avoid the circular 0.5-mile-radius
area centered on San Francisco Approach Lighted
Whistle Buoy SF, steer a course to enter the charted
eastbound San Francisco Bay traffic lane. The recom-
mended route for outbound vessels is via the charted
westbound San Francisco Bay traffic lane to the pre-
cautionary area of the San Francisco Traffic Separation
Scheme.
- (136) Vessels with a draft of 45 feet or greater bound for
the deepwater anchorages S of the San Francisco-Oak-
land Bay Bridge or N to San Pablo Bay and Carquinez
Strait should use the charted **Deep Water Route E** of the
Golden Gate Bridge. Vessels intending to use the Deep
Water Route should notify San Francisco Traffic before
passing Mile Rocks. Deep draft vessels will neither meet
nor overtake in the Deep Water Route. Deep draft vessels
bound for Anchorage 9, S of San Francisco-Oakland Bay
Bridge, should pass E of Blossom Rock then through the
C-D or D-E spans of the bridge.
- (137) From the Golden Gate Bridge, vessels with drafts
less than 45 feet bound for San Pablo Bay and Carqui-
nez Strait set a course to follow the charted Traffic

Separation Scheme to the precautionary area E of Alca-
traz Island, thence N through the charted Traffic Sepa-
ration Scheme to San Pablo Bay and Carquinez Strait.

- (138) Mariners are cautioned that the traffic lanes be-
tween Angel Island and North Point are frequently
crossed by tugs with barges, and self-propelled dredges.
These vessels normally transit to and from the dumping
ground S of Alcatraz Island.

Channels

- (139) The principal approach to San Francisco Bay is
through the buoyed **Main Ship Channel** over the bar on
bearing **070°** toward Alcatraz Light. The project depth
is 55 feet in the 2,000-foot wide channel. (See Notice
to Mariners and latest edition of chart for controlling
depths.) A wreck covered 62 feet lies near the middle of
the channel at 37°47’23”N., 122°33’16”W.
- (140) From N, coasters and other vessels use buoyed **Bo-
nita Channel**, between the E end of Potatopatch Shoal
and the shore N of Point Bonita. The channel is nar-
rowed to 0.2 mile by several rocky patches including
Sears Rock, covered 22 feet, 1.2 miles NW of Point Bo-
nita.

Regulated navigation areas

- (141) **Security zones** have been established in the en-
trance to San Francisco Bay (Main Ship Channel) and
Golden Gate. (See **165.1183** and **165.1187**, chapter 2,
for limits and regulations.)
- (142) A **Regulated Navigation Area** has been established
in Golden Gate and San Francisco Bay. (See **165.1181**,
chapter 2, for limits and regulations.)

Caution

- (143) Vessels departing San Francisco Bay through Bo-
nita Channel on the ebb current must use extreme cau-
tion when crossing the tide rip off Point Bonita. When
the bow passes the rip the stern is thrown to port and,
unless promptly met, the vessel will head straight for
the rocks off the point. Vessels favoring Potatopatch
Shoal too closely have reported a set toward it.
- (144) Bonita Channel should not be used by large ves-
sels. Strangers wishing to cross the bar in thick weather
should either wait for clearing or take a pilot. Fog is
prevalent in the Golden Gate; radar is a great aid here.
- (145) It has been reported, however, that radar targets at
the entrance to San Francisco Bay may be difficult to
identify at times because of ghost echoes.

Currents

- (146) The currents at the entrance to San Francisco Bay
are variable, uncertain, and at times attain considerable
velocity. Immediately outside the bar there is a slight
current to the N and W, known as the **Coast Eddy Cur-
rent**. The currents at San Francisco Approach Lighted
Whistle Buoy SF are described in some detail in the
Tidal Current Tables. The currents most affecting navi-
gation in this vicinity are the tidal currents. Across the

bar the flood current converges toward the entrance and is felt sooner around Point Lobos and Point Bonita than across the Main Ship Channel. The ebb current spreads from the entrance over the bar, but the main strength is WSW, parallel with the S edge of the Potatopatch Shoal, and through the Main Ship Channel. In the Bonita Channel the ebb current is weak and of short duration; the flood current begins so early that during the last half of the ebb in the Golden Gate the current in Bonita Channel forms an eddy flowing SE around Point Bonita into Bonita Cove.

(147) In the vicinity of Mile Rocks the currents attain considerable velocity within a few minutes after slack on both flood and ebb.

(148) In the Golden Gate the flood current sets straight in, with a slight tendency toward the N shore, with heavy overfalls both at Lime Point and Fort Point when strong. It causes an eddy in the bight between Point Lobos and Fort Point. The ebb current has been observed to have a velocity of more than 6.5 knots between Lime Point and Fort Point, and it sets from inside the bay on the N side toward the latter point. Like the flood current, it causes an eddy in the bight between Fort Point and Point Lobos, and a heavy rip and overfall reaching about 0.25 mile S from Point Bonita. At the Golden Gate Bridge, large current eddies near the foundation piers cause ships to sheer off course. Daily current predictions are given in the Tidal Current Tables.

Weather, San Francisco Bay

(149) The climate of the San Francisco Bay Area is classified as a Mediterranean Climate, which generally means that summers are dry, sunny, and warm and winters are wet and occasionally stormy. However, the Mediterranean Climate classification is somewhat of a simplification and in reality the Bay Area has several climate regimes, sometimes referred to as microclimates. Significant differences in temperature, winds, and fog patterns over relatively short distances are due to variations in air mass between land and sea and to the complex terrain of the coastal mountain ranges. Gaps in the coastal mountain ranges further modify weather conditions on a local scale.

Spring

(150) Storms that periodically affect the region during the winter months often continue with regularity into March, but by April the storm track begins to shift N and storms rolling inland off the Pacific become less frequent. The rainy season is typically over by mid-April and the variation in wind direction that occurs with passing storms mostly ends by May. During spring, an area of high pressure over the Pacific gradually strengthens and moves N. Meanwhile, longer days and a more direct sun angle result in increased warming over land, particularly in the interior valleys. Warming near the surface causes air to rise and air pressures near the surface to fall. The resulting difference between

high pressure over the ocean and low pressure over land bring about increased W to NW onshore winds during the spring months. In fact, spring is generally the windiest time of the year. However, springtime weather can be highly variable and onshore breezes do not blow as consistently as they do in the summer months. The region can experience several days of generally light winds before the next round of brisk W to NW winds kick up. Wind speeds with the stronger springtime wind events sometimes reach gale force over the coastal waters outside the Golden Gate, and approach Gale Force locally in northern San Francisco Bay. W to NW winds during the spring months decrease farther inland and are generally lighter in the delta and into the Central Valley.

(151) Strong springtime winds over the coastal waters kick up rough and choppy seas with short period swells. The large, long-period swells that are common during the winter months still roll through the coastal waters quite often during the early spring, but taper off significantly by late spring as the storm track across the Pacific becomes less active.

(152) Persistent NW winds along the California coast during the spring months enhance the river of surface water flowing S and parallel to the coast known as the California current. In the northern hemisphere, oceanic currents are deflected to the right by the Coriolis force. The deflection carries surface water offshore and causes cold nutrient-rich water from the bottom of the ocean to surge up along the coast. As moist air blowing across the Pacific comes into contact with the cold waters near the coast, condensation occurs and a layer of low clouds and/or fog develops. The low clouds that form in this situation are called stratus clouds. Stratus clouds are gray with generally uniform bases. They usually do not produce precipitation, although drizzle can sometimes occur if the stratus layer is sufficiently thick. When stratus and fog are present along the coast, meteorologists often use the term "marine layer." The marine layer is a moist and cool layer near the surface that is capped by an inversion (a very stable atmospheric condition where warm air lies above cold air). The marine layer ranges in depth from just a few hundred feet to as much as 4000 feet. The depth of the marine layer depends on the height of the inversion above the surface, and the inversion height is regulated by various atmospheric conditions as well as land-sea interaction. The marine layer can exist without low clouds and fog, but typically clouds and/or fog are present when there is a marine layer. In the spring and summer months, fog and low clouds typically form first over the coastal waters and are then swept inland with onshore breezes through the Golden Gate or other low spots in the coastal ranges. This type of fog is referred to as "advection fog." People often mistakenly refer to stratus clouds as fog or "high fog." By definition, fog is composed of tiny water droplets that are in contact with the surface, essentially a cloud in contact with the ground. The distinction between stratus clouds and fog is important because fog

reduces visibility and makes marine navigation more difficult or even dangerous. Stratus clouds, on the other hand, do not by themselves reduce the visibility at the water's surface.

(153) Dense fog is defined as a fog that reduces visibility to one-half mile or less on San Francisco Bay or to one mile or less over the coastal waters. Advection fog is not usually dense over the bays and into the Delta and Central Valley. However, this type of fog can often be dense over the coastal waters when the marine layer is shallow. Under those circumstances the fog is usually confined to the coastal waters and moves only locally into San Francisco Bay, usually around the Golden Gate. Because the marine layer typically is not as shallow in the spring months as in summer, episodes of coastal dense fog are not as common in spring as in summer. Also, the low levels of the atmosphere are more stable in summer than in spring which is another factor contributing to a greater incidence of dense coastal fog in summer compared to the spring months.

(154) Dense fog is more common in San Francisco Bay, and especially in the delta and central valley, during the winter months. That type of fog is called "radiation fog." Radiation fog is covered in more detail in the winter section.

Summer

(155) During the months of June, July and August the Eastern Pacific high is well established offshore while a trough of low pressure is a nearly a constant feature over California's interior. The inland low pressure is often referred to as a "thermal trough" because its formation and strength is primarily driven by strong surface heating that persists throughout the great Central Valley during the dry and sunny summer months. The pressure difference between the eastern pacific high and thermal trough over the interior maintain both northwesterly winds over the coastal waters and onshore winds through the coastal gaps and across the bays. Persistent NW winds over the coastal waters in turn maintain cold upwelling near the coast. Meanwhile subsidence under the strengthening eastern Pacific high produces additional warming aloft and strengthens the low level inversion, effectively placing a "cap" on the marine layer. Because these meteorological conditions are in place nearly every day in the summer, the marine layer is a semi-permanent fixture along the California coast from June through August. Fog and low clouds can remain entrenched along the coast for days, sometimes weeks, at a time.

(156) Marine layer fog and low clouds generally begin to roll in off the ocean and spread into San Francisco Bay through the Golden Gate and gaps in the coastal mountains during the late afternoon or early evening hours, when surface heating by the sun diminishes. The fog and low clouds then typically travel E toward the Berkeley hills where they spread both N and S, eventually covering the bay and adjoining land areas. Fog and

stratus are most widespread around the bay from late night until a few hours after sunrise. By mid morning the strong summer sun provides enough heating to begin dissipating the fog and stratus. Clearing typically occurs in the bay by midday, but often remains over the coastal waters through the day.

(157) How far inland the stratus and fog develop overnight depends primarily on the depth of the marine layer, but also on the strength of the onshore flow. If the marine layer is shallow (i.e., less than 1000 feet) low clouds will spread only locally inland around San Francisco Bay, but seldom reach farther inland into the Delta and never into the Central Valley. A shallow marine layer typically results in more fog and reduced visibilities, especially over the coastal waters and locally into San Francisco Bay from the Golden Gate E to Alcatraz or Angel Island.

(158) A deeper marine layer and stronger onshore flow will allow stratus to surge well inland through the delta overnight and sometimes as far inland as Sacramento and Stockton by sunrise. Inland marine surges such as these typically are characterized by low overcast conditions and lack of fog. Daytime clearing is gradual, and low clouds often persist near the Golden Gate and locally around the Bay well into the afternoon.

(159) During the summer months winds throughout the area follow a daily cycle that is most heavily influenced by inland heating during the day and cooling at night. The general tendency during the summer is for winds to blow from high pressure offshore to low pressure over land. This sea to land wind flow is referred to as "onshore flow." The magnitude of the onshore flow is regulated by the daily cycle of differential heating between land and sea. Because ocean temperatures remain nearly constant from day to night, the most important factor in driving the daily wind cycle is inland heating. Daytime heating over land causes surface air pressure to drop during the afternoon hours, and the difference between high pressure over the ocean and low pressure over land increases. Onshore winds begin to increase by early afternoon and reach a peak by late afternoon into the early evening hours. Winds then gradually subside during the evening as surface heating over land decreases. Wind speeds reach their lowest point late at night and remain relatively light through mid morning before the cycle starts over again. Wind direction is generally W to E (from sea to land), but wind direction exhibits a great deal of variation on a local scale; that variation is due primarily to mountain/valley location and orientation and gaps in the coastal mountain ranges. Of course the most prominent gap in the coastal ranges is the Golden Gate and it is here the onshore winds funnel inland with the least amount of resistance. Once the airflow moves through the Golden Gate, it fans out across the northern San Francisco Bay, deflected to the SE toward the southern part of the bay and the warm Santa Clara Valley, to the NE toward Carquinez Strait and delta and the heat of the Central Valley beyond, and toward

the N into the Petaluma and Napa Valleys of the North Bay. The strongest afternoon and evening summer sea breezes occur along the route from the Golden Gate to the Central Valley, specifically past Alcatraz and the southern end of Angel Island, Point Blunt, E to Berkeley and then N past Pinole Point, NE to the Carquinez Strait and finally E into the Delta and Central Valley where the airflow spreads out and diminishes. Afternoon and evening wind speeds frequently reach 20 to 25 knots (meeting small craft advisory criteria) in northern San Francisco Bay from mid afternoon through mid evening during the summer months. In fact, small craft advisory conditions occur nearly every day in summer through this area and wind speeds sometimes reach 30 knots locally. Gales are rare in summer, but can occur during an unusually intense onshore push. Marine air spills inland through other gaps in the coastal ranges including the San Bruno gap just to the WNW of San Francisco Airport (SFO). Some of the strongest sea breezes occur on the W side of the Bay from Hunters Point S through the area around SFO, and small craft conditions are common here as well. Elsewhere in the Bay, summer sea breezes generally do not exceed 20 knots. Wind speeds gradually taper off throughout the Bay after sunset and reach a low point from the late night hours through late morning. On many days winds can be variable at less than 10 knots during this time. But once surface heating increases in the interior around midday, the daily cycle begins again and onshore winds began to increase.

(160) Over the coastal waters outside of the Golden Gate, in the Gulf of the Farallones, summer winds are predominantly from the NW, parallel to the coast and the coastal mountain ranges. Maximum wind speeds here occur from mid afternoon to mid evening, similar to the time of maximum sea breeze winds in San Francisco Bay. Wind speeds generally range from 5 to 15 knots during the night and morning hours, and increases to 10 to 20 knots in the afternoon and early evening hours, but can often reach 25 knots. Strongest NW winds over the coastal waters in summer typically occur to the S of points and capes.

(161) During the summer months seas in the coastal waters are mostly generated from local winds and therefore have a short period and tend to be choppy. Large long period swell from the open ocean contribute much less to the overall wave spectrum than in the late autumn to early spring time frame. Swell direction is predominantly from the NW, but during the late summer swell with an S to SW direction become more frequent. The southerly swells are generated from tropical storms over the Pacific. Because these swells originate a long distance from our coast, they typically have long periods, generally 15 seconds or more.

(162) Although summer time wind patterns over the coastal waters and through the Bays and into the Central Valley are consistent in their direction and diurnal patterns, occasionally the typically wind patterns are disrupted. This disruption occurs when high pressure

builds inland over the Pacific Northwest and over the Great Basin. At the same time, the trough of low pressure that usually resides over the interior of California drifts to the W and sets up over the coastal waters. Under this scenario, the usual pattern of high pressure over the ocean and low pressure over land is reversed and winds then blow from land to sea. This is called offshore flow. Because these winds originate over land, they are typically hot and dry. Also, the air mass undergoes further warming as it descends mountain ranges on its journey from inland areas to the sea. Strongest winds during offshore wind events typically occur in the hills of the northern and eastern San Francisco Bay Area during the late night and morning hours, but offshore winds can sometimes reach 20 knots or more through Carquinez Strait to the Golden Gate. Even during offshore wind events, a weak late afternoon and early evening sea breeze often develops. Often too, the start of an offshore wind event is characterized by strong and gusty northerly winds down the Sacramento Valley and across the Delta. Winds over the coastal waters during offshore wind events are usually light, except locally moderate just outside the Golden Gate.

(163) Offshore flow events usually last no more than two or three days before the inland high pressure breaks down and onshore flow returns. Often, offshore events are followed by a phenomenon known as a “southerly surge.” A southerly surge occurs when surface air pressure over the coastal waters on the lee side of the coastal ranges drop. When the pressure along the northern California coast drops lower than along the southern California coast, a southerly wind develops. Usually, the onset of southerly winds is also accompanied by a fog bank that surges up along the coast in a very shallow marine layer. During southerly surge events, weather conditions over the coastal waters can change rapidly from light winds with clear skies, to 15 to 20 knots of southerly winds accompanied by thick fog reducing visibilities to less than a half mile. Once the leading edge of the southerly surge reaches the Golden Gate, the colder fog-laden airmass surges inland across northern San Francisco Bay towards Carquinez Strait. Here too, weather conditions can change rapidly from light winds to SW winds reaching 25 knots or greater. After several hours, the shallow marine layer deepens and onshore breezes spread out across a more widespread area, and locally strong winds gradually subside.

Autumn

(164) Weather in and around San Francisco Bay is most tranquil during the months of September, October and November. The Pacific high gradually weakens while heating over the interior subsides and weakens the inland thermal trough. Pressure gradients relax and wind speeds ease over the ocean and bays. The trend toward lighter winds starts in late summer (August) and continues through autumn. Gales are almost nonexistent from August through October. Offshore wind events are

most common during the autumn months. Because of the weakened sea breezes, and more frequent offshore wind events, the marine layer becomes less prominent during the autumn and low clouds and fog are less prevalent than in summer. Wave heights are also at a minimum during the autumn months. Storms over the northern Pacific become stronger and more common by late October and early November. This is when long period swells from the W and NW begin to increase along the northern and central California coast.

Winter

(165) The storm track across the Pacific becomes increasingly active in November and also migrates to the S. By the second half of the month weather systems begin to roll through the San Francisco Bay Area. Most rainfall in the Bay Area falls between mid-November and lasts until early April, with the stormiest months being December, January, and February. Late November and much of March can also have active stormy times. Some storms during the winter months can produce powerful winds and seas, conditions that can be very hazardous to the mariner.

(166) As frontal systems approach the coast, winds from the S and SE increase in magnitude. Typically, strongest winds in the winter occur in the hours prior to a cold frontal passage. Depending on the strength of the storm, southerly winds ahead of the cold front can easily reach 20 knots across the region, often 25 knots and sometimes gale force. Although rare, storm force winds of 48 knots or greater can occur with the strongest of these winter storms. A few notable cases of storm force winds over San Francisco Bay are December 12, 1995 and January 4, 2008. Strong south winds occur on a large scale and are not as dependent on topography and microclimates as the summer sea breeze is. Gale force winds can occur anywhere from the coastal waters E through the delta and into the Central Valley.

(167) After frontal passage winds veer to the SW and eventually W and NW. Generally wind speeds decrease significantly after frontal passage, but can remain quite strong and gusty for several hours after frontal passage. On occasion, winds will veer from SE to SW after frontal passage, only to swing back to the S or SE a few hours later before gradually veering back to the W and NW.

(168) Winter is the season with the most significant seas, both in terms of locally driven wind waves and open ocean swells that are built by long fetches of strong winds over the eastern Pacific. Seas can be confused ahead of a front with wind waves moving from S to N on top of long period swells coming in from the W or NW. Seas can often build enough to produce breakers across the San Francisco bar, several miles offshore of the Golden Gate. These breaking waves in the open ocean present a significant danger to mariners, especially those unfamiliar with the area. Breakers across the bar are most common with a W long period swell, during maximum ebb current through the Golden Gate.

(169) Although the strongest winds occur during the winter months, there are often long periods of tranquil weather in the winter when the storm track can shift to the N for weeks at a time. During this time, high pressure dominates the area and sets up conditions where the low levels are very stable and an inversion develops over the inland valleys. Widespread fog will develop if the surface is sufficiently moist during these times (after soaking rains), particularly in the Central Valley. This type of radiation fog can be particularly dense and persistent and is often referred to as “tule fog.” Visibilities often fall to near zero in the southern Sacramento Valley, northern San Joaquin Valley, and through the Delta, making marine navigation in these areas dangerous. Lowest visibilities occur late at night through the mid morning hours. Visibilities improve by late morning and often the fog layer lifts into a low overcast during the afternoon. Sometimes if there is a light offshore flow during a tule fog event, dense fog can develop W into northern San Francisco Bay and even spread S into the S part of the bay. It is during these times that San Francisco Bay realizes its worst visibility problems.

(170) Offshore winds during the winter months are generally light. However, locally strong and gusty easterly winds can occur through Carquinez Strait and also over the coastal waters below coastal canyons. On some clear winter mornings when winds are light from the E across most of the region, locally strong winds have been reported along the San Mateo and Marin county coasts.

(171) Winter can be highly variable in terms of weather. Long periods of dry weather with light winds can be followed by weeks of stormy weather with only short breaks in between individual storms. Years of studies have concluded that sea surface temperature anomalies in the equatorial Pacific can have an impact on the overall amount of precipitation and storminess across California during the winter months. When El Nino conditions exist, sea surface temperatures in the eastern tropical Pacific are above normal. Strong or moderately strong El Nino winters are characterized by higher than normal precipitation across central and southern California. However, this does not mean that individual storms with the heaviest rain and strongest winds occur during El Nino winters. In fact, two of the most powerful winter storms to pummel the region in the past 20 years occurred during non El Nino winters. The upshot is that mariners need to be prepared for the possibility of dangerous storms in any winter, and not assume that navigating the open ocean and bays will be easier during non El Nino winters.

Pilotage, San Francisco

(172) Pilotage in and out of San Francisco is compulsory for all vessels of foreign registry and U.S. vessels under enrollment not having a federal licensed pilot on board. The San Francisco Bar Pilots provide pilotage to ports

in San Francisco Bay and to ports on all tributaries to the bay, including Stockton and Sacramento.

- (173) The San Francisco Bar Pilots keep one of two vessels on station at all times, the SAN FRANCISCO or the CALIFORNIA. The pilot boats are 85 feet long with a blue waterline band, international orange hull, and white superstructure. The top of the cabin houses, the mast, and after deck covers are orange. The word "PILOT" is shown on the fore part as well as the port and starboard sides of the midship house. The boat displays the standard day and night signals. The pilot vessel cruises on station 24 hours a day near the San Francisco Approach Lighted Whistle Buoy SF, or, in foul weather, seaward of it. Prior arrangements with the bar pilots' office can be made by telephone 415-393-0457, telex (SF Pilot 415-371-5595), fax messages 415-982-4721, or cable (BARPILOTS, San Francisco). If prior arrangements have not been made with the pilots' office on Pier 9, masters may give these signals upon approaching the San Francisco Approach Whistle Buoy SF:

- (174) **Clear visibility:** by day, hoist code flag "G"; by night, four long flashes on the signal lamp. **Limited visibility:** four long blasts and lay to. The pilot boat monitors VHF-FM channels 10, 13, and 16. The pilot boats' radio calls are SAN FRANCISCO WYZ-8288 and CALIFORNIA WYK-4689; the pilot office call is KMG-389; cable address: BARPILOTS, San Francisco. The office monitors VHF-FM channel 10. Masters or agents are requested to advise the pilots whenever there is a change in the draft, arrival or sailing time, or maneuvering or equipment limitations.

- (175) The pilots board directly from the pilot boat. Pilot ladders should be rigged clear of all discharges and spouts about 10 feet from the waterline and amidship of the vessel at all times. The ladder must comply with International Maritime Organization (IMO) and IMPA recommendations and be made in one length and not consist of two lengths shackled or lashed together, and should be equipped with spreaders about ten feet apart to comply with SOLAS Regulation 17, Chapter 5, (not in this text). A light must be ready to illuminate the ladder if necessary. Contact pilot boat about 30 minutes prior to arrival to determine on what side the ladder should be rigged. No lines should be attached to the lower end of the ladder. A manrope, heaving line, and a ring buoy with a self-igniting light must be provided; vessel speed, 6 to 8 knots.

- (176) Pilot boarding is usually conducted in all but the most severe conditions. Extensive fog conditions are often experienced. Strong currents, accelerated by river freshets in the winter and spring months, often exist and greatly alter the predicted current calculations.

- (177) The preferred anchorage for deep-draft vessels in the vicinity of the bar pilots pickup station (San Francisco Approach Lighted Whistle Buoy SF) is an area with a 1 mile radius centered in 37°49'N., 122°42'W. Anchoring offshore is strictly forbidden. Exceptions may

be made for vessel engine casualties or severe weather preventing transit into port. Any vessel anchoring outside of established anchorages is required to notify the VTS immediately.

- (178) **Inbound tank vessels under escort embark pilots about 1 mile W of San Francisco Approach Lighted Whistle Buoy SF.**

Coast Guard

- (179) Golden Gate Coast Guard Station is about 0.4 mile NNE of the bridge at the entrance to Horseshoe Bay. Station Golden Gate is participating in the Coastal Weather Display Program. A 35-foot flag pole is located near the S end of the Coast Guard Station, visible to mariners exiting San Francisco Bay. Coastal warning flags will be flown from one hour before sunrise to one hour after sunset. (See illustration; Chapter 1.)

- (180) Weather flags are flown only at select Coast Guard stations to supplement other weather notification sources. Light signals corresponding to these flags are not displayed at night. In all cases mariners should rely upon National Weather Service broadcasts as their primary source of government provided weather information.

State regulations

- (181) **Tank Vessel Escort Regulations** have been established by the State of California for San Francisco, San Pablo, and Suisun Bays. Tank vessel masters, owners, and operators are expected to be familiar and in compliance with the regulations. Failure to be in compliance may result in unsafe transit delays, and fines. The regulations can be found at <http://www.dfg.ca.gov>, or may be obtained by calling the California Office of Spill Prevention and Response 24-hour Communications Center at 916-445-0045. Tank vessel masters should contact their agent or vessel manager/owner for additional information. The San Francisco Marine Exchange may also be able to provide mariners with additional information and can be contacted at 915-441-6600.

Chart 18650

- (182) **San Francisco**, one of America's great cities, occupies the N portion of the peninsula forming the S entrance to the bay. The 3-mile N shore of San Francisco from the Golden Gate Bridge to the main waterfront includes the **Presidio of San Francisco**; several yacht harbors; Government buildings and piers on Black Point; Aquatic Park; and Fisherman's Wharf. Shoals with depths less than 10 feet extend up to 0.2 mile from the shore.

- (183) The charted **recreation area** extending along this shore is intended primarily for use by recreation vessels. It should not be utilized by vessels 300 tons or more for through passage or for any other purpose, except in case of emergency or special circumstances.

(184) **Alcatraz Island**, 2.5 miles E of the Golden Gate Bridge, is one of the leading marks in entering San Francisco Bay. The small island is 148 feet high and has many buildings on it. Near the NW end of the island is a water tower, which is reported to be usually the only landmark visible when that area is in fog. **Alcatraz Light** (37°49'34"N., 122°25'20"W.), 214 feet above the water, is shown from a gray, octagonal pyramidal tower on the SE part of the island. A sound signal is on the extreme NW end of the island.

(185) A rock awash, marked on its W side by a bell buoy, is 125 yards W of the NW end of Alcatraz Island. The rocks and tide pools, which extend about 100 feet from the S tip of the island, are reported to cover at high water.

(186) Mariners are advised that surveys indicate shoaling tends to build to the NW of the disposal area S of Alcatraz Island and caution should be used in the area. A shoal oriented SW to NE with a least depth of 34 feet extends off the E shore of the island.

(187) Alcatraz Island, a part of the Golden Gate National Recreation Area, is administered by the Department of Interior's National Park Service.

(188) Federal regulations require that prior permission to land at Alcatraz, or to berth vessels at Fort Mason, Black Point, and Aquatic Park must be obtained from the General Superintendent, Golden Gate National Recreation Area, Fort Mason, San Francisco, CA 94123.

(189) A passenger ferry, which operates frequently, uses a dock on the SE side of the island. In 1979, 28 feet was reported off the dock.

(190) **Yerba Buena Island**, 345 feet high and 2.5 miles SE of Alcatraz Island, is of small extent, irregular in shape, and covered with a scrubby growth of trees. On its summit is a former lookout tower and the Coast Guard operated San Francisco Vessel Traffic Service Operation Center and radar antenna site. **San Francisco Coast Guard Station** is on the E side of the island.

(191) **Treasure Island** is a low filled area N of and connected by a causeway to Yerba Buena Island. Built originally for the San Francisco International Exposition of 1939-40, Treasure Island now belongs to the city of San Francisco. A light is on the N end of the island and a shoal, covered 15 feet, is off the N end of the island.

(192) When the prevailing W winds are blowing, deep-draft vessels proceeding to the berthing area on the E side of the island may have extreme difficulty making the 90° turn from the narrow channel between the 30-foot curves SE of Yerba Buena Island.

(193) **Naval restricted areas**, are off the N end of Treasure Island and between this island and Yerba Buena Island. (See **334.1070** and **334.1080**, chapter 2, for limits and regulations.) A **restricted area** surrounds the Coast Guard Station off the E side of Yerba Buena Island. (See **334.1065**, chapter 2, for limits and regulations.)

(194) The **San Francisco-Oakland Bay Bridge**, one of the longest bridges in the world, crosses the bay from **Rincon Point** in San Francisco to Yerba Buena Island, thence to Oakland. Racons mark the main bridge spans.

The recommended passage for southbound traffic is under the NE half of span A-B (midspan clearance 204 feet). Northbound traffic should use the SW half of span D-E (midspan clearance 204 feet). The midspan clearance of spans B-C and C-D are each 220 feet. In 2010, a fixed highway bridge between Yerba Buena Island and Oakland was under construction just N of the existing span, with a design clearance of 112 feet. The Coast Guard requests that mariners use the temporary main channel designated between piers I and J on the existing bridge, and piers E-3 and E-4 on the bridge under construction. These clearances are approximate; they may be reduced by several feet due to heavy traffic on the bridge and prolonged periods of extremely high temperature, and as much as 10 feet under extreme conditions. Maintenance scaffolding located in each span reduces vertical clearance by approximately 5 feet and is lighted at night with red lights. Caltrans will move the scaffolding if requested for the passage of vessels. Mariners should contact Caltrans Toll Sergeant at 510-286-1148.

(195) The **Port of San Francisco** is the oldest on the Pacific coast. Though primarily a general cargo port, grain, bulk liquids, containers, newsprint, automobiles, bananas, copra, cotton, and other commodities are handled here. San Francisco is a popular port of call for passenger vessels on regular scheduled and special cruises.

Prominent features

(196) The skyline of the city of San Francisco is unmistakable, with several dominant landmarks: the 980-foot television tower supporting three antennas, the pyramid-shaped Transamerica Building, the Coit Tower on Telegraph Hill 3.4 miles E of the bay entrance, and the Bay Bridges with their freeway elevated approaches. Inside the bay, the Bank of America Building, the Bank of America Clock Tower, the clock tower at the S end of the San Francisco-Oakland Bay Bridge, the old Ferry Building with its 240-foot clock tower on the waterfront S of Pier 1, and the U.S. Coast Guard radar tower on Yerba Buena Island are prominent.

(197) The **Ferry Building**, terminal of many ferry boats, also houses the **San Francisco Port Authority** offices, the offices of the Marine Exchange, Inc., and the many offices and exhibits of the World Trade Center.

Channels

(198) Depths of 45 feet or more are available from the Golden Gate Bridge to most of the anchorages; depths ranging from 29 to 40 feet can be taken to most of the San Francisco piers.

Anchorage

(199) General, naval, and explosives anchorages are in San Francisco Bay. (See **110.1** and **110.224**, chapter 2, for limits and regulations.)

Warning

- (200) Two submarine pipeline areas cross San Francisco Bay within General Anchorage 9; one crosses between Metropolitan Oakland International Airport and **Brisbane**, and the other about 1.5 miles to the S. Mariners are cautioned not to anchor in these areas. (See chart 18651.)

Dangers

- (201) **Anita Rock**, 1.1 miles E of Fort Point and 300 yards from shore, is covered 3 feet and marked by a light.
- (202) There are several rocky patches with depths of 33 to 35 feet W and NW of Alcatraz Island that must be avoided by deep-draft vessels. The northwesternmost of these shoals is **Harding Rock**, marked by a lighted buoy equipped with a racon.
- (203) **Blossom Rock**, covered 40 feet and marked on the W side by a lighted bell buoy, is about 1 mile SE of Alcatraz Island. Another rock, covered 43 feet, is 0.3 mile S of Blossom Rock.
- (204) The Trans-Bay Tube of the Bay Area Rapid Transit District crosses San Francisco Bay from the vicinity of the Ferry Tower to Oakland. Mariners are **prohibited** from dropping or dragging anchors when in the vicinity of the tunnel crossing.
- (205) Heavy tide rips occur in the vicinity of Alcatraz Island.

Regulated navigation areas

- (206) **Regulated navigation areas** have been established in the waters of San Francisco Bay. (See **165.1181** and **165.1185**, chapter 2, for limits and regulations.)

Currents

- (207) Inside the Golden Gate the flood current sets into all parts of the bay and causes swirls from the Golden Gate as far E as Alcatraz and Angel Islands and through Raccoon Strait, N of Angel Island. The ebb current, inside the Golden Gate, is felt first along the S shore. In the Golden Gate, the average duration of the ebb stream is somewhat greater than that of the flood. The Sacramento and San Joaquin Rivers have weak flood currents during periods of freshets.
- (208) The San Francisco-Oakland Bridge has large current eddies near the foundation piers that cause ships to sheer off course.
- (209) Strong currents due to heavy spring runoffs have been reported along the San Francisco waterfront between pier 39 (37°48'36"N., 122°24'38"W.) and pier 94 (37°44'34"N., 122°22'13"W.)

Caution

- (210) Oakland's Seventh Street Marine Terminal, about 1 mile E of Yerba Buena Island, forms a current lee on both the flood and the ebb current. Vessels making for Middle Harbor and Oakland Inner Harbor on a flood current will encounter a lee on the S side of the terminal; when the bow enters the slack water, the vessel will

tend to sheer to the left. Similarly, vessels bound for the Outer Harbor on an ebb current will encounter slack water on the N side of the terminal, with a tendency to sheer to the right. This condition may be dangerous to deep-draft, loaded vessels, and should be anticipated.

- (211) See the Tidal Current Tables for daily predictions for San Francisco Bay area.

Weather, San Francisco

- (212) San Francisco enjoys a marine-type climate characterized by mild and moderately wet winters and by dry, cool summers. Winter rains (December through March) account for about three-fourths of the average annual rainfall of just over 19 inches (483 mm), and measurable precipitation occurs on an average of 13 days per month during this period. Snowfall occurs, but is infrequent. The greatest amount is 1.5 inches (38 mm) recorded in January 1962. Flurries have occurred in each month, December through March. There are frequent dry periods lasting well over a week. Severe winter storms with gale winds and heavy rains occur only occasionally. December is the month most likely to experience gales followed by January. Thunderstorms average five a year and may occur in any month, but are usually very mild.

- (213) The daily and annual range in temperature is small ranging from an average annual maximum of 65.2°F (18.4°C) and an average annual minimum of 48.7°F (9.3°C). A few frosty mornings occur during the winter, but the temperature seldom drops below freezing. The coldest temperature on record at the International Airport is 24°F recorded in December 1972. Each month, November through March, has recorded temperatures below freezing (0°C). Winter temperatures generally rise to the high fifties (13.9° to 15°C) in the early afternoon.

- (214) The summer weather is dominated by a cool sea breeze resulting in an average summer wind speed of nearly 13 knots. Winds are light in the early morning, but normally reach 17 to 22 knots in the afternoon, depending on location. Where topography and man-made structures funnel the winds, higher gusts may occur in those areas.

- (215) A sea fog, arriving over the station during the late evening or night as a low stratified cloud, is another persistent feature of the summer weather. This "high" fog, occasionally producing drizzle or mist, usually disappears during the late forenoon. Despite the morning overcast, summer days are remarkably sunny. On the average a total of only 15 days during the 4 months from June through September are classified as cloudy.

- (216) Daytime temperatures are held down both by the morning low overcast and the afternoon strengthening sea breeze, resulting in daily maximum readings averaging in the lower- to middle seventies (21.7° to 23.9°C) from May through August. However, during these months occasional "hot" spells lasting a few days are experienced without the usual "high" fog and sea

Facilities in the Port of San Francisco

	Name	Location	Berthing Space (feet)	Depths* (feet)	Deck Height (feet)	Mechanical Handling Facilities and Storage	Purpose	Owned/ Operated by:
1	Pier No. 45 (Sheds B and D)	37°48'36"N., 122°25'06"W.	1,200	14-25	12	• Covered storage (88,150 square feet) • Six mast-and-boom derricks	• Receipt of seafood • Mooring fishing vessels	Port of San Francisco
2	Pier No. 35	37°48'35"N., 122°24'23"W.	2,055	35	12	Passenger terminal (32,000 square feet)	• Mooring cruise ships • Boarding passengers	Port of San Francisco/ Metropolitan Stevedore Company
3	Pier No. 33	37°48'32"N., 122°24'15"W.	1,624	15	12	Covered storage (66,900 square feet)	• Receipt of seafood • Mooring fishing vessels and excursion boats	Port of San Francisco
4	Pier Nos. 17 and 15	37°48'09"N., 122°23'48"W.	2,085	17-35	12	• Covered storage (173,700 square feet) • Open storage (33,000 square feet)	Mooring floating equipment	Port of San Francisco/ Baydelta Maritime
5	Pier No. 9	37°48'05"N., 122°23'44"W.	1,754	15	12	Covered storage (61,200 square feet)	Mooring floating equipment and pilot boats	Port of San Francisco/ Blue and Gold Fleet and San Francisco Bar Pilots
6	Pier No. 50 Mission Rock Terminal	37°46'25"N., 122°22'54"W.	4,155	35-45	12	Covered storage (231,700 square feet)	Mooring vessels and equipment	Port of San Francisco/ Westar Marine Services and Clean Bay Cooperative
7	Pier No. 54	37°46'11"N., 122°23'01"W.	1,550	18-20	12	Covered storage (15,000 square feet)	• Mooring vessels • Receipt of seafood	Port of San Francisco/ Crowley Maritime Cooperation
8	Pier No. 70	37°45'43"N., 122°22'47"W.	2,480	35	12	Tank storage (404,000 barrels)	Mooring vessels	Port of San Francisco
9	North Container Terminal (Pier No. 80)	37°45'02"N., 122°22'33"W.	5,091	38	13	• Covered storage (393,000 square feet) • Four traveling container cranes (up to 40 long tons)	• Receipt and shipment of conventional, containerized, and roll-on/roll-off general cargo	Port of San Francisco/ Marine Terminals Corp.
10	Pier No. 92	37°44'50"N., 122°22'48"W.	868	35	12	• Tank storage (2.9 million gallons) • Open storage (20,000 tons of sand) • Belt conveyor	• Shipment of tallow • Receipt of sand	Port of San Francisco/ Darling International, Inc. and Mission Valley Rock
11	Pier Nos. 94 and 96	37°44'34"N., 122°22'13"W.	2,456	40	14	• Open storage (76 acres) • Four traveling container cranes (up to 40 long tons)	Mooring vessels	Port of San Francisco

* The depths given above are reported. For information on the latest depths contact the port authorities or the private operators.

breeze. September, when the sea breeze becomes less pronounced, is the warmest month with an average maximum of 73°F (22.8°C). Minimum temperatures during the summer are in the lower- to middle fifties (10.6° to 12.8°C). The all-time high temperature recorded at the International Airport is 106°F (41.1°C) recorded in June 1961.

(217) A strong temperature inversion with its base usually at a height of 1,500 feet (458 m) persists throughout the summer. Inversions close to the ground are infrequent in summer, but rather common in fall and winter. As a consequence of these factors and the continued population and economic growth of the area, atmospheric pollution has become a problem of increasing importance.

(218) The National Weather Service maintains offices in Oakland, Redwood City, and at San Francisco International Airport; barometers may be compared there or by telephone. (See Appendix A for addresses.)

(219) (See Appendix B for **San Francisco climatological table**.)

Towage

(220) Tugboats are available in sufficient quantity for the traffic in the greater harbor.

Quarantine, customs, immigration, and agricultural quarantine

(221) (See chapter 3, Vessel Arrival Inspections, and Appendix A for addresses.)

(222) San Francisco–Oakland is a **customs port of entry**.

(223) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Coast Guard

(224) **Sector Office San Francisco** is located on Yerba Buena Island. (See Appendix A for addresses.) **San Francisco Coast Guard Air Station** is at San Francisco International Airport. A Coast Guard base and station are on the E side of Yerba Buena Island.

(225) The **Marine Exchange** of the San Francisco Bay region reports and records all Golden Gate ship arrivals and departures and conducts communications to

serve the bay area commercial traffic. The station can be called 24 hours a day for relay of messages and other marine related services on VHF-FM channels 10 and 18. The station also monitors channels 13 and 16. The ship spotting station is located in Building B, Fort Mason, about 2.5 miles E of the Golden Gate Bridge.

Harbor regulations

(226) The Port of San Francisco is under control of the city of San Francisco, and its management is vested in the San Francisco Port Commission, in direct charge of the port director of that body. The office of the **Chief Wharfinger** is in the Ferry Building.

(227) The harbor regulations are prescribed by the San Francisco Port Authority and enforced by the Chief Wharfinger.

(228) In addition to the San Francisco Port Authority regulations, the Coast Guard Captain of the Port has issued the following supplemental regulations for vessels carrying explosives and certain hazardous bulk cargoes. Vessels entering or leaving San Francisco Bay laden with explosives (Class A or Military) having a net explosive weight in excess of 100 short tons for ships and in excess of 5 short tons for barges, or carrying certain dangerous cargo as listed in **33 CFR 160.204**, may be escorted by a Coast Guard patrol craft while underway within the bay. These escorts are at the discretion of the Captain of the Port (COTP). Each vessel shall coordinate all movements with the Captain of the Port and ensure:

(229) (a) Speed of transit shall not exceed 12 knots.

(230) (b) No Vessel movement will occur unless visibility is a minimum of 1,000 yards, in/out or within the San Francisco Bay area.

(231) (c) A 96 hour advance notice of arrival is required.

(232) (d) Vessels shall participate in the Vessel Traffic Service (VTS) and adhere to the traffic separation scheme, except as permitted by VTS or COTP.

Wharves

(233) The general cargo and specialized terminals of the Port of San Francisco are on the bay and on Islais Creek. All of the piers listed are owned by the San Francisco Port Authority and leased to private concerns. Only the major piers are listed in the table. The alongside depths given for each facility are reported depths. (For information on the latest depths, contact the Port of San Francisco.) Cargo at the port is handled mostly by ship's tackle, but hoisting and heavy lift equipment is available in the port. Most piers have electrical shore power and water connections.

(234) The Port of San Francisco is served by the Union Pacific Railroad. The port offers wharf side intermodal transfer of containers between ship and rail at both the San Francisco Container Terminals North (Pier 50) and South (Piers 94 and 96), and has a dedicated Intermodal Container Transfer Facility located adjacent to Container Terminal South with direct access to both terminals. Most of the port's inbound and outbound cargo moves

to and from the piers by truck. The Embarcadero, a four-lane thoroughfare, provides access to most of the piers. For a complete description of the port facilities refer to Port Series No. 30, published and sold by the U.S. Army Corps of Engineers. (See Appendix A for address.)

(235) **China Basin**, 1.1 miles S of the Ferry Building, is a canal extending about 0.6 mile SW from San Francisco Bay. The 3rd and 4th Street bascule bridges across the canal have a least clearance of 1 foot. (See **117.1 through 117.59 and 117.149**, chapter 2, for drawbridge regulations.) The bridgetender monitors VHF-FM channel 9 and works on channels 13, 17, and 65A; call sign WXY-959, San Francisco Drawbridges. China Basin is a no anchorage zone.

(236) **Islais Creek Channel** is entered 2.9 miles S of the Ferry Building. A dredged approach area with a project depth of 35 feet is off the entrance. Two bascule bridges, the Illinois Street Bridge and the 3rd Street Bridge, cross the creek about 0.6 mile above the mouth; both have clearances of 4 feet. (See **117.59 and 117.163**, chapter 2, for drawbridge regulations.) The bridgetender at the 3rd Street Bridge monitors VHF-FM channel 16 and uses channel 9 for working; call sign WXY-977, San Francisco Drawbridges.

Supplies

(237) Fuel oils, gasoline, and all other marine supplies and services may be had in any desired quantity. Fuel oil is usually delivered by barge. Water can be obtained on the piers or by barge.

Repairs

(238) San Francisco, Oakland, Richmond, and Alameda have facilities for making repairs to vessels and machinery of all kinds and sizes. The largest commercial floating drydock in San Francisco has a length of 900 feet, width of 148 feet, and a lifting capacity of 65,000 tons. There are several small drydocks on the San Francisco side, and several marine railways and floating docks on the Oakland side.

Ferries

(239) High-speed commuter ferries frequently operate in central/south San Francisco Bay and San Pablo Bay. Concentrations of these ferries are highest around the San Francisco Ferry Building (37°47'45"N., 122°23'35"W.) where most central bay routes terminate. Mariners are cautioned when transiting these waters that ferries may maneuver quickly when approaching and departing the dock. Departing ferries from the Ferry Building often back away from the dock. Charted ferry routes can be seen on applicable charts of the area; however, mariners are cautioned that these ferries may deviate from their routes due to inclement weather, traffic conditions, navigational hazards, or other emergency conditions.

(240) In San Francisco Bay charted ferry routes run N and S in North Channel (E of Angel Island) and in the Precautionary Area just E of Alcatraz Island. They

generally run E and W in the waters between Alcatraz Island and Angel Island. The routes cross each other in the Precautionary Area (37°49'30"N., 122°24'10"W.) and about 1.2 miles S of the Richmond-San Rafael Bridge. In these areas all vessels should maintain a close watch for ferries. In San Pablo Bay, ferry routes run in both directions just S of Pinole Shoal Channel between the Richmond-San Rafael Bridge and Mare Island; one route runs E of East Brothers Island. Many ferries also operate between San Francisco's north shore, Alcatraz and Sausalito/Tiburon. These ferries do not run along charted ferry routes. They too may back away when departing San Francisco docks and may maneuver rapidly when approaching San Francisco.

- (241) The **San Francisco Harbor Safety Committee**, in conjunction with the Coast Guard, has established a **Ferry Traffic Routing Protocol** for: the area surrounding the Ferry Building terminal along the waterfront of San Francisco, the waters of central San Francisco Bay, and the waters of San Pablo Bay. The protocol is intended to increase safety in the area by reducing traffic conflicts and, while not compulsory, the guidelines set forth in the protocol are strongly recommended. The Harbor Safety Committee also recommends that recreational and fishing vessels keep a close lookout when near ferry routes, and avoid ferry routes whenever possible. For additional information, see the San Francisco Vessel Traffic Service website <http://www.uscg.mil/d11/vtssf> and San Francisco Marine Exchange website <http://www.sfmex.org>.

Communications

- (242) San Francisco is the terminus of several transpacific steamship lines and the port of call for numerous lines of foreign, coastal, and intercoastal vessels. It is served directly by a major highway and is connected by the Bay Bridge to several others. The city is served by three transcontinental railroads; connections to two of the railroads are by barge, while one has tracks extending S and E around the S bay. San Francisco International Airport is on the W shore of the bay about 5 miles S of the city; it is served by many airlines.

Small-craft facilities

- (243) San Francisco Municipal Yacht Harbor, 1.8 miles E of the Golden Gate Bridge with a W and E basin about 0.3 mile apart, has depths of 8 to 12 feet to the berths. A light near the end of a point marks the N side of the entrance to W basin; a prominent stone tower is 0.2 mile W of the light. The E basin is protected on the N by a breakwater extending E from the W shore, and on the E by a pier of **Fort Mason**. The seaward end of the breakwater is marked by a light. E basin is entered between the breakwater light and the pier. The harbor accommodates about 700 boats in the W and E basins. Guest berths are available; transients should report to the harbor master's office on the S side of the W basin for berth assignment.

- (244) **Aquatic Park**, 2.6 miles E of the Golden Gate Bridge, is a recreation area protected on the W by a curved pier extending out from Black Point and on the E by a pier that berths historic ships of the National Maritime Museum. The basin is closed to power vessels, and other vessels must stay offshore away from buoys marking a swimming area. The **speed limit** is 3 knots. Depths of 9 to 16 feet are inside the basin. Small craft can find anchorage in about 13 feet. Permission to anchor for more than 24 hours must be obtained from the Aquatic Park Ranger Station.

Charts 18651, 18652

- (245) S of San Francisco, **Point Avisadero**, which is the E extremity of Hunters Point, **Sierra Point**, Oyster Point, **Point San Bruno**, and Coyote Point, all on the W shore of the bay, are prominent natural features. The Bayshore Freeway extends S on a filled area from the vicinity of **Candlestick Point**, and cuts back inland at Sierra Point. Sierra Point is the site of a small-boat harbor which can accommodate about 500 boats. **Oyster Point Channel**, marked by private lights, has depths of about 5 feet, except for a 2-foot shoal in about 37°40'09.5"N., 122°22'47.5"W., and leads to a small basin. A spur channel, marked by private lights, branches off the N side of Oyster Point Channel and leads to the entrance to the small-boat harbor at Sierra Point. The basin at the end of Oyster Point Channel has two private wharves in ruins and sheds on the W side; a marina that can accommodate about 200 boats is on the S side.

- (246) **Oyster Point**, a low filled area, is the site of a small-boat harbor accommodating about 570 boats. Depths of about 8 feet are in the harbor. An entrance channel E of the harbor is marked by private lights. In 2006, the channel had a reported depth of 10 feet. Transients should report to the harbor master's office for berth assignment. A prominent sculptured tower is on the hill 0.7 mile S of Oyster Point; the tower is floodlighted.

- (247) The area between Point San Bruno and Coyote Point is occupied by **San Francisco International Airport**. A **security zone** has been established in the waters surrounding the airport. (See **165.1192**, chapter 2, for limits and regulations.)

- (248) **Coyote Point** is covered by a heavy growth of trees and is raised as an island. It is the most prominent point on the S bay. A small-craft harbor accommodating about 580 boats is on the E side of the point. The entrance channel, marked by two private lights, had a reported depth of depth of 10 feet in 2006. The harbor, operated by San Mateo County, is composed of two basins having depths of about 8 feet. Transients should report to the harbor master's office on the NW side of the harbor for berth assignment; guest berths are usually available. A harbor patrol boat is maintained.

(249) (See the small-craft facilities tabulation on chart 18652 for services and supplies available at the small-craft facilities at Oyster Point and Coyote Point.)

(250) The **San Mateo-Hayward Bridge** crossing the lower part of San Francisco Bay near **San Mateo** has a fixed span with a clearance of 135 feet over the main channel. The bridge is marked at mid span by a racon. An overhead power cable with a clearance of 160 feet over the main channel crosses the bay just S of the bridge.

(251) A section of the old San Mateo lift bridge, now used as a fishing pier, extends 4,135 feet from the San Mateo shore just S of the new bridge. A part of the fishing pier extends into the W part of the main channel.

(252) In 1983, a 34-foot shoal was reported to extend from under to just SE of the bridge in about 37°35'N., 122°15'W.

(253) **Redwood Creek**, 4 miles SE of San Mateo Bridge, is entered through a marked channel that leads to the municipal wharves at the **Port of Redwood City**, 2.5 miles above the mouth. Turning basins are to the N and S of the wharves. Federal project depths are 30 feet in the channel and basins. (See Notice to Mariners and latest editions of charts for controlling depths.)

(254) Traffic in the waterway is in bulk cement, gypsum, rock salt, sand, and scrap metal. Overhead power cables across the waterway have a clearance of 155 feet. Prominent silos of a cement plant are at the junction with **Westpoint Slough**, just N of the port.

Wharves

(255) The Port of Redwood City operates five deepwater municipal wharves. Only the wharves with shiphandling facilities are described. For a complete description of the port facilities refer to Port Series No. 30, published and sold by the U.S. Army Corps of Engineers. (See Appendix A for address.)

(256) Wharves 1 and 2 (37°30'47"N., 122°12'35"W.): 1,651 feet of berthing space with dolphins; 32 to 35 feet alongside; deck height, 15 feet; storage silos with a total capacity of 58,000 tons; open storage for 85,000 tons of sand; receipt of sand and bulk cement; various operators.

(257) Wharf 3 (37°30'42"N., 122°12'40"W.): just S of Wharves 1 and 2; 750 feet of berthing space with dolphins; 34 feet alongside; deck height, 15 feet; conveyor systems with up to 500-ton-per-hour capacity; two 40-ton, diesel crawler cranes; open storage for 50,000 tons of scrap metal and 60,000 tons of gypsum; receipt of bauxite, mill scale, gypsum, and sand; shipment of scrap metal; various operators.

(258) Wharf 4 (37°30'34"N., 122°12'43"W.), just S of Wharf 3, is operated by the U.S. Geological Survey, Department of the Interior, and is used for mooring research vessels. Wharf 5 (37°30'25"N., 122°12'44"W.), just S of Wharf 4, is operated by the Port of Redwood City and is used for mooring cruise vessels.

(259) Cargill Salt, Redwood City Wharf (37°30'16"N., 122°12'55"W.): 620 feet of berthing space; 30 feet

alongside; deck height, 16 feet; occasional shipment of liquid magnesium chloride; owned and operated by Cargill Salt Inc.

(260) **Redwood City** is 2 miles S of the port facilities. Redwood City Municipal Marina, just S of the port in about 37°30'08"N., 122°12'45"W., can accommodate about 225 small craft. Other small-craft facilities are further upstream in Redwood Creek. A full service marina on the S side of Westpoint Slough can accommodate vessels up to 120 feet.

(261) **Ravenswood Point** and **Dumbarton Point** are at the head of the bay and the mouth of Coyote Creek. Two bridges and an aqueduct cross the bay at this point. The **Dumbarton Highway Bridge**, the NW bridge, has a fixed span with a clearance of 85 feet. About 1,100 yards SE of the Dumbarton bridge, an aqueduct, used to supply the city of San Francisco with water, crosses the bay. On the W shore, the aqueduct is carried on a trestle to a concrete building (charted) where it tunnels the channel to the E shore. The **Dumbarton Railroad Bridge**, just S, has a swing span with a clearance of 13 feet. The bridge is maintained in the open position. (See **117.1 through 117.49**, chapter 2, for drawbridge regulations.)

(262) **Coyote Creek** has many tributary sloughs. The main channel is marked as far as **Calaveras Point**, about 4 miles above the railroad bridge at Dumbarton Point. The power cables, 1.3 miles above Calaveras Point, have a clearance of 65 feet.

(263) A channel, marked by a daybeacon at the entrance, leads for about 3 miles through **Guadalupe Slough**. In 1985, a submerged obstruction with 3 feet over it was about 150 yards NNW of Daybeacon 20; caution is advised when transiting the area. An overhead power cable with a clearance of 65 feet crosses the slough about 1 mile above the entrance.

(264) Just S of the Metropolitan Oakland International Airport, a dredged channel leads to a small-craft harbor operated by the city of San Leandro. The channel is marked by lights and daybeacons; a seasonal sound signal is at the entrance. In 2011-2012, the controlling depth was 4 feet in the entrance channel to the basin, thence 2 feet in the access channel through the basin. The access channel branching E from the entrance to the basin had a depth of 5 feet.

(265) The harbor accommodates about 500 small craft; 15 guest slips are maintained. The harbormaster's office is on the SW side of the basin. A high-speed patrol boat is maintained. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Charts 18650, 18652

(266) **Alameda** is on an island separated from the mainland by **San Leandro Bay** on the E, and Oakland Inner Harbor and Tidal Canal on the N. A ferry terminal owned



by the City of Alameda and operated by the Blue and Gold Fleet LP, is at Alameda (37°47'28"N., 122°17'38"W.) The ferry service operates daily to Oakland and San Francisco.

Coast Guard

(267) The Coast Guard Shore Infrastructure Logistics Center is on **Coast Guard Island** (Government Island). A **security zone** has been established along the SW side of the island surrounding the Coast Guard pier. The security zone extends into the navigation channel about 10 to 20 yards at each end and is outlined by a floating security barrier. (See **33 CFR 165.1190**, chapter 2, for limits and regulations.)

(268) **Ballena Bay Yacht Harbor**, a large small-craft harbor, is on the E side of an island along the S shore of Alameda. This harbor offers safe refuge in storms. A private light marks the entrance to the harbor. In 2006, a reported depth of 7 feet was in the approach to the harbor; a depth of 8 feet was reported alongside the berths. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.) A depth of 9 to 10 feet is available in the channel between the island and Alameda. A fixed bridge, with a clearance of 5 feet, crosses the channel about midway along the N shore of the island.

(269) **Oakland**, on the E or mainland shore opposite San Francisco, is the second largest city on San Francisco Bay. It is the main-line terminus of the transcontinental railroads entering the San Francisco Bay area.

(270) The **Port of Oakland** is entirely distinct from the Port of San Francisco; it is a separate customs **port of entry**. The Port of Oakland is the largest general cargo port on the bay, and a leading container-ship terminal on the Pacific coast.

(271) The Port of Oakland encompasses two areas: Outer and Inner Harbors. **Oakland Outer Harbor** is between the Ben E. Nutter Container Terminal (Seventh Street Marine Terminal) on the S and the San Francisco-Oakland Bay Bridge approach on the N. A **restricted area** is in the N end of Oakland Outer Harbor adjacent to the Oakland Army Base. (See **334.1050** and **334.1060**, chapter 2, for limits and regulations.)

(272) **Oakland Inner Harbor** is that part of Inner Harbor Channel extending E from San Francisco Bay to **Tidal Canal**. It is adjacent to the most highly developed section of the city, bordering Oakland to the N and Alameda to the S. At the E end of the harbor, the artificial Tidal Canal leads to San Leandro Bay where a channel continues to the Metropolitan Oakland International Airport. Mariners should exercise caution when transiting Oakland Inner Harbor to prevent wake damage to boats moored at marinas along the waterway.

Facilities in the Port of Oakland							
Name	Location	Berthing Space (feet)	Depths* (feet)	Deck Height (feet)	Mechanical Handling Facilities and Storage	Purpose	Owned/ Operated by:
1 Burma Road Terminal (Berth 7)	37°49'12"N., 122°19'03"W.	1,459	35	14	• Covered storage (80,000 square feet) • One 100-ton gantry crane	Receipt and shipment of break bulk general cargo	Port of Oakland/ Marine Terminals Corp.
2 Outer Harbor Container Terminal (Berths 20, 21 and 22)	37°49'09"N., 122°18'39"W.	2,241	42	14	• Open storage (59 acres) • Three container cranes (30 long tons)	Receipt and shipment of containerized cargo	Port of Oakland/ Maersk Pacific, Ltd.
3 Outer Harbor Container Terminal (Berth 23)	37°49'02"N., 122°18'56"W.	900	42	14	• Open storage (46 acres) • Two container cranes (50 long tons)	Receipt and shipment of containerized cargo	Port of Oakland/ Yusen Terminals, Inc.
4 Outer Harbor Container Terminal (Berth 24)	37°48'53"N., 122°19'04"W.	1,138	42	14	• Open storage (57 acres) • Three container cranes (50 long tons)	Receipt and shipment of containerized cargo	Port of Oakland/ Maersk Pacific, Ltd.
5 Outer Harbor Container Terminal (Berths 25 and 26)	37°48'43"N., 122°19'15"W.	1,138	42	14	• Open storage (40 acres) • Two container cranes (40 long tons)	Receipt and shipment of containerized cargo	Port of Oakland/ TransBay Container Terminal Company
6 Outer Harbor Container Terminal (Berth 30)	37°48'37"N., 122°19'31"W.	1,075	42	14	• Open storage (33 acres) • Three container cranes (40 long tons)	Receipt and shipment of containerized cargo	Port of Oakland/ TransBay Container Terminal Company
7 Outer Harbor Container Terminal (Berths 32, 33 and 34)	37°48'39"N., 122°19'53"W.	2,481	38	14	• Open storage (65 acres) • Three container cranes (40 long tons)	• Receipt and shipment of containerized cargo • Receipt and shipment of roll-on/roll-off cargo	Port of Oakland/ Stevedoring Services of America Terminals
8 Ben E. Nutter Container Terminal (Berths 35, 37 and 38)	37°48'26"N., 122°20'23"W.	2,480	35	12	• Open storage (58 acres) • Five container cranes (50 long tons)	Receipt and shipment of containerized cargo	Port of Oakland/ Marine Terminals Corp.
9 Middle Harbor Container Terminal (Berths 55 and 56)	37°47'52"N., 122°19'15"W.	2,400	42	14	• Open storage (120 acres) • Four container cranes (60 long tons)	Receipt and shipment of containerized cargo	Port of Oakland/ Hanjin Shipping Co.
10 Middle Harbor Container Terminal (Berths 60, 61, 62 and 63)	37°47'37"N., 122°18'01"W.	2,743	42	14	• Open storage (81 acres) • Five container cranes (45 long tons)	Receipt and shipment of containerized cargo	Port of Oakland/ American President Lines
11 Schnitzer Steel Products 7th Street Pier	37°47'38"N., 122°17'33"W.	875	36	12	• Open storage (33 acres) • One traveling container crane (30 long tons)	Shipment of ferrous scrap metal	Schnitzer Steel Products Co.
12 Schnitzer Steel Products 6th Street Pier	37°47'39"N., 122°17'30"W.	700	36	11	Belt-conveyor and vessel loading spout (500 tons per hour)	Shipment of shredded scrap metal	Schnitzer Steel Products Co.
13 Schnitzer Steel Products Bulkhead Wharf	37°47'43"N., 122°17'22"W.	500	31	10	Barge mounted cranes and crawler cranes	Receipt of scrap metal	Schnitzer Steel Products Co.
14 Charles P. Howard Container Terminal (Berths 67 and 68)	37°47'41"N., 122°17'03"W.	2,016	42	14	• Open storage (50 acres) • Four traveling container crane (50 long tons)	Receipt and shipment of conventional, containerized, and roll-on/roll-off general cargo and heavy lift items	Port of Oakland/ Stevedoring Services of America Terminals

* The depths given above are reported. For information on the latest depths contact the port authorities or the private operators.

(273) A **restricted area** is in Oakland Inner Harbor from the entrance to the E boundary of the Naval Air Station. (See **334.1020** and **334.1030** chapter 2, for limits and regulations.)

Channels

(274) A **Federal project** provides for a depth of 50 feet from the Bar Channel to and including the Oakland Outer Harbor, 50 feet in the Inner Harbor Reach, thence 35 feet from the Grove Street Pier to the Park Street Bridge Reach, thence 18 feet to Tidal Canal. (See Notice to Mariners and latest editions of charts for controlling depths.)

Bridges

(275) The fixed highway bridge across Brooklyn Basin at the E end of Coast Guard Island has a clearance of 11

feet. The three highway drawbridges across Tidal Canal have a least clearance of 15 feet. The vertical lift railroad bridge across Tidal Canal has a clearance of 13 feet down and 135 feet up. The bridgetenders monitor VHF-FM channel 16 and work channel 9. (See **117.1 through 117.59** and **117.181**, chapter 2, for drawbridge regulations.)

Quarantine, customs, immigration, and agricultural quarantine

(276) (See chapter 3, Vessel Arrival Inspections, and Appendix A for addresses.)

(277) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Harbor regulations

- (278) The Port of Oakland is under the jurisdiction of the Board of Port Commissioners of the City of Oakland, and is managed by an executive director. The port's general offices are at 530 Water Street, Oakland, CA 94607.

Wharves

- (279) The Port of Oakland owns the facilities engaged in handling general cargo in the port, and their operation is carried out through private companies. The port also has a number of smaller piers and wharves that are used for mooring small vessels, repair work, and for other purposes. Most major deep-draft facilities are listed in the table. The alongside depths given for each facility are reported depths. (For information on the latest depths contact the Port of Oakland or the facility operator.) General cargo at the port is usually handled by ship's tackle; special handling equipment, if available, is mentioned in the description of the particular facility. Floating cranes with lifting capacities to 350 tons are available.

- (280) The port is served by two transcontinental railroads: Burlington Northern Santa Fe Railway and Union Pacific Railroad; and by two switching carriers: Alameda Belt Line and the Oakland Terminal Railway. Truck connections are also available to the city's freeway system. For a complete description of the port facilities, refer to Port Series No. 31, published and sold by the U.S. Army Corps of Engineers. (See Appendix A for address.)

Supplies

- (281) Bunker fuel, diesel oil, gasoline, water, and most other marine supplies and services are available in Oakland. Bunker fuel is usually delivered by barge.

Repairs

- (282) A drydock and repair firm in Oakland has a maximum drydock capacity of 2,800 tons; marine railways here are capable of hauling out to 500 tons. All kinds of repairs are made to both hulls and engines.

Small-craft facilities

- (283) There are many small-craft facilities on both sides of the channel from Oakland Inner Harbor entrance to the airport at the S end of San Leandro Bay. Mariners should exercise caution when transiting Oakland Inner Harbor to prevent wake damage to boats moored at marinas along the waterway.

Communications

- (284) Oakland is served directly by three major highways, with connections to several others. The city is the main-line terminus of three transcontinental railroads. Metropolitan Oakland International Airport, on the bay about 5 miles SE of the city, is served by many airlines.

Chart 18650

- (285) **San Leandro Channel** connects San Leandro Bay with San Francisco Bay. The channel is very narrow with shallow uneven depths at the E end. Mariners should seek local knowledge before transiting the channel. Three bascule bridges, operating simultaneously, with a minimum clearance of 20 feet at the S side of the draw, cross the channel at its E end. The bridgetender for the San Leandro Bay bridges at Alameda monitors VHF-FM channel 16, and works on channel 9; call sign: WHX 870, Bay Farm Island Bridge. (See **117.1 through 117.59 and 117.193**, chapter 2, for drawbridge regulations.)

Charts 18649, 18653, 18652

- (286) **Berkeley**, the site of the University of California, adjoins Oakland and **Emeryville** to the N. The long pier extending into the bay is marked by a light; the 1.7-mile offshore section of the pier is in ruins, and the inshore 3,000-foot section is used for fishing. In clear weather the Campanile (bell tower) at the university shows prominently from the bay.

- (287) **Berkeley Yacht Harbor**, on the N side of the long pier, is protected at the entrance by two detached breakwaters. The S breakwater is marked by lights on the ends and at the center. The N breakwater is marked by a light on the NE and SW ends. The N side of the entrance into the harbor is marked by a private light, and the S side by a private light and sound signal. **Berkeley Reef**, awash, is 0.9 mile NW from the inner harbor entrance; it is marked by a light. About 925 boats can be accommodated in the harbor, including 20 guest berths. Transients should report to the harbormaster's office on the S side of the harbor.

- (288) Two marinas are at Emeryville, about 1.5 miles S of Berkeley Yacht Harbor. The enclosed basin can accommodate about 730 small craft.

- (289) (See the small-craft facilities tabulation on chart 18652 for services and supplies available at Berkeley Yacht Harbor and at Emeryville.)

- (290) **Southampton Shoal Light** (37°52'55"N., 122°24'01"W.), 32 feet above the water, is shown from a white cylindrical tower near the S end of the 1.6-mile-long shoal. A sound signal (bell) is at the light. A wreck covered 4 feet lies 0.6 mile to the NE at 37°53'16"N., 122°23'18"W.

- (291) Vessels going from San Francisco Bay proper bound for Richmond usually use the 45-foot project channel through the shoal area NW of Southampton Shoal Light.

- (292) **Red Rock**, 3.2 miles NNW of Southampton Shoal Light, is 169 feet high and prominent in the S approach. Buoyed **Castro Rocks**, 0.6 mile ENE of Red Rock, are small and low.



(293) **Richmond Harbor**, on the E shore of San Francisco Bay 1.5 miles N of Southampton Shoal Light, includes the port facilities to Point San Pablo. The harbor is served by two Class I railroads, and is an important oil refining center and oil shipping port.

Channels

(294) A **Federal project** provides for a depth of 45 feet in Southampton Shoal Channel and in the maneuvering area off Richmond Long Wharf, thence 38 feet in the channels leading to the port facilities at the Port of Richmond, to a point about 2,000 feet in Sante Fe Channel, thence 30 feet in the remainder of Sante Fe Channel and the turning basin. The channel is well marked by navigational aids. (See Notice to Mariners and latest editions of charts for controlling depths.) A 10,000-foot training wall is S of the dredged channel and extends W from Brooks Island.

(295) A **Federal project** further provides for an approach area 32 feet deep to the wharves at Point Orient and Point San Pablo. (See latest editions of charts for controlling depths.)

Regulated Navigation Areas

(296) A **security zone** has been established around the Chevron Long Wharf. (See **165.1197**, chapter 2, for limits and regulations.) A **restricted area** extends 0.3 mile offshore at Molate Point, site of a Navy fuel depot 0.8

mile N of Richmond-San Rafael Bridge. (See **334.1090**, chapter 2, for limits and regulations.) In 2000, shoaling to 16 feet was off the end of the Navy depot in about 37°56'47"N., 122°25'40"W. **Regulated navigation areas** are in the entrance channel and between Point Richmond and Point Potrero. (See **165.1181**, chapter 2, for limits and regulations.)

Quarantine, customs, immigration, and agricultural quarantine

(297) (See chapter 3, Vessel Arrival Inspections, and Appendix A for addresses.)

(298) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Wharves

(299) Commodities handled at the Port of Richmond consist primarily of crude oil, petroleum products and miscellaneous dry and liquid bulk cargoes. All major deep-draft facilities are listed in the table. The alongside depths given for each facility are reported; the operators of the wharves should be contacted for information on the latest depths. Most of the large oil wharves have hose-handling cranes. Of the facilities listed, all have truck access and most have railconnections to Class I railroads. Water and electrical shore power are available at most piers.

Facilities in the Port of Richmond								
	Name	Location	Berthing Space (feet)	Depths* (feet)	Deck Height (feet)	Mechanical Handling Facilities and Storage	Purpose	Owned/ Operated by:
1	Port of Richmond Terminal No. 4 Wharf	37°57'47"N., 122°25'46"W.	1,047	32-35	14	• Tank storage (504,500 barrels) • One 5-ton mobile crane	Receipt and shipment of liquid bulk products (petroleum products, petrochemicals, chemicals, vegetable oils)	City of Richmond/ Paktank Corp.
2	Chevron Products Richmond Long Wharf	37°55'19"N., 122°24'39"W.	3,065	40-50	15	• Tank storage (20.2 million barrels) • Pipelines extend from wharf to refinery	• Receipt of crude oil • Receipt and shipment of petroleum products	Chevron Products Co.
3	Port of Richmond Point Potrero Marine Terminal No. 7 Wharf	37°54'27"N., 122°21'50"W.	1,615	38	12	• Open storage (40 acres with an additional 50 acres available if needed)	Occasional receipt and shipment of general cargo	City of Richmond/ Pasha Group
4	ARCO Products Richmond Tanker Wharf	37°54'43"N., 122°21'53"W.	710	38	12	• Tank storage (737,000 barrels) • Pipelines extend from wharf to tanks	Receipt and occasional shipment of petroleum products	ARCO Products Co.
5	Tosco Refining Richmond Tanker Wharf	37°54'54"N., 122°21'55"W.	836	37	12	• Tank storage (857,300 barrels) • Pipelines extend from wharf to tanks	Receipt and shipment of petroleum products and liquid bulk products (solvents, vegetable oils, coconut oil, caustic soda)	Tosco Refining Co./ Tosco Refining Co. and GATX Terminals Corp.
6	Tosco Refining Richmond Barge Wharf	37°54'58"N., 122°21'56"W.	836	37	12	• Tank storage (5,000 barrels) • Pipelines extend from wharf to tanks in Ref. No 5	Shipment and occasional receipt of petroleum products	Tosco Refining Co.
7	National Gypsum Richmond Dock	37°55'10"N., 122°22'06"W.	600	38	9-11	• Covered storage (40,000 tons of gypsum) • Belt conveyor (1,400 tons per hour)	Receipt of gypsum rock	National Gypsum Co., Gold Bond Building Products
8	Castrol North America Richmond Wharf	37°55'21"N., 122°22'26"W.	700	32	7	• Tank storage (85,000 barrels) • Pipelines extend from wharf to tanks	Receipt and shipment of petroleum products	Castrol North America, Incorporated
9	IMTT-Richmond Richmond Wharf	37°55'16"N., 122°22'09"W.	650	38	8	Tank storage: (441,200 barrels petroleum products) (4.2 million gal. caustic soda) (2.5 million gal. paraffin wax)	• Receipt and shipment of petroleum products • Receipt of caustic soda and paraffin wax	IMTT-Richmond-CA
10	Levin-Richmond Terminal Richmond Wharf (Berths A, B and C)	37°55'16"N., 122°22'01"W.	1,450	34-37	13	• Open storage (15 acres) • Five gantry cranes (25-50 tons) • Belt-conveyors (600 tons per hour)	• Shipment of scrap metal and petroleum coke • Receipt of miscellaneous dry bulk commodities	Levin-Richmond Terminal Corporation
11	Shore Terminals Richmond Wharf	37°55'05"N., 122°21'51"W.	700	33	12	• Tank storage (618,000 barrels) • Pipelines extend from wharf to tanks	Receipt and shipment of petroleum products	Shore Terminals LLC
12	Port of Richmond Terminal No. 2 Upper Wharf	37°54'59"N., 122°21'44"W.	300	38	13	• Tank storage (2 million gallons) • Pipelines extend from wharf to tanks	Receipt and shipment of edible oils	City of Richmond/ California Oils Corp.
13	Port of Richmond Terminal No. 3 Wharf	37°54'47"N., 122°21'42"W.	1,109	38	13	• Open storage (18 acres) • Two traveling container cranes (37 ton)	Receipt and shipment of conventional general cargo (steel, wood products and heavy lift items)	City of Richmond/ Stevedoring Services of America

* The depths given above are reported. For information on the latest depths contact the port authorities or the private operators.

(300) General cargo at the port is usually handled by ship's tackle; special handling equipment, if available, is mentioned in the table under 'Mechanical Handling Facilities'. For a complete description of the port facilities refer to Port Series No. 31, published and sold by the U.S. Army Corps of Engineers. (See Appendix A for address.)

Repairs

(301) Repairs to fishing boats, recreational craft and other types of small vessels can be made at three marine

repair yards on the Santa Fe Channel. A marine railway at one of the yards has a 20-ton hauling capacity and boat lifts to 88 tons are also available. There are no floating drydocks for public use at the port; the nearest such facilities are located at Oakland.

Small-craft facilities

(302) A marina and yacht club are in **Richmond Marina Bay** and a private yacht harbor is on the E side of Point Richmond. Available services include: transient berths,

gasoline, diesel fuel, electricity, water, ice, pump-out and a launching ramp.

Bridge

(303) The 21,343-foot **Richmond-San Rafael Highway Bridge**, 8.8 miles above the Golden Gate Bridge, is one of the longest fixed high level double deck bridges. The E 970-foot fixed channel span clearance is 135 feet; the W fixed span has a 1,000-foot opening with a clearance of 185 feet. The centerline of both channels through the bridge spans is marked by a racon. The bridge is well lit, and the channels leading to it are marked with navigational aids.

(304) **Invincible Rock**, 1.3 miles N of Richmond-San Rafael Bridge, is covered 7 feet. **Whiting Rock**, covered 13 feet, is 0.2 mile NNE of Invincible Rock. Both rocks are buoyed. The buoy marking Whiting Rock is reported to submerge during strong ebb currents caused by the heavy spring runoffs in the area. Large vessels changing course and other craft in this area are advised to use caution.

(305) **The Brothers**, 1.7 miles N of Richmond-San Rafael Bridge, are two small low flat-topped islands. **East Brother Island Light** (37°57'48"N., 122°26'01"W.), 61 feet above the water, is shown from a buff square tower on the E island; a seasonal sound signal is at the station.

(306) **Point San Pablo**, 0.3 mile NE of East Brother Island Light, is the NW extremity of a low ridge of hills on the E shore of San Francisco Bay at its junction with San Pablo Bay. The point rises abruptly to a height of 140 feet. A dredged channel off the NE shore of the point is used by commercial and sport fishermen. Depths of 8 feet were reported in the channel to the fishery and the former whaling station docks.

(307) A small-boat basin used by commercial and sport fishermen is 0.5 mile SE from Point San Pablo.

(308) A private yacht basin is 1 mile SE from Point San Pablo. A channel leading to the basin has reported depths of about 2 feet.

(309) **Point Cavallo**, on the W side of San Francisco Bay 0.5 mile NE of the Golden Gate Bridge, is sharp and rocky with some visible and covered rocks under its face. **Horseshoe Bay** is a shallow bight W of the point.

Coast Guard

(310) Golden Gate Coast Guard Station is located at the entrance to Horseshoe Bay. Station Golden Gate is participating in the Coastal Weather Display Program. A 35-foot flag pole is located near the S end of the Coast Guard Station, visible to mariners exiting San Francisco Bay. Coastal warning flags will be flown from one hour before sunrise to one hour after sunset. (See illustration; Chapter 1.)

(311) Weather flags are flown only at select Coast Guard stations to supplement other weather notification

sources. Light signals corresponding to these flags are not displayed at night. In all cases mariners should rely upon National Weather Service broadcasts as their primary source of government provided weather information.

(312) From Point Cavallo the steep rocky shore tends N for 0.3 mile to **Yellow Bluff**, thence NW for 1 mile to Sausalito. A rock, covered 5 feet, is about 100 yards ESE of Yellow Bluff in about 37°50.2'N., 122°28.2'W.

(313) **Richardson Bay**, 2 miles N of the Golden Gate Bridge, is shoal except for the S part fronting Sausalito. In the N part of Richardson Bay, a wildlife sanctuary, established by the National Audubon Society, provides safe refuge for migratory fowl that arrives each fall. The sanctuary is closed to marine traffic from October to March. Seasonal buoys N of a line approximately 097° True from Strawberry Point to Belvedere, mark the perimeter of the sanctuary. Three concrete piles topped by white cones, also mark the southern edge of the sanctuary. A special anchorage is in Richardson Bay. Local authorities control the anchoring of vessels and placement of moorings in Richardson Bay. Mariners should contact the Richardson Bay Regional Agency at (415) 289-4143 for specific information. Richardson Bay is a no-discharge zone; it is illegal for vessels to discharge any form of waste into the bay. (See **110.1 and 110.126a**, chapter 2, for limits and regulations.) A channel leading NW through Richardson Bay to facilities at Sausalito is marked by lights, daybeacons, and buoys.

(314) A **no-wake speed limit** is in all channels in Richardson Bay.

(315) **Sausalito** harbors some commercial fishing boats and many pleasure craft. Several boatbuilding and repair yards have marine ways, the largest of which can handle craft up to 350 tons. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

(316) The Corps of Engineers has an operations base and model current-flow basin at Sausalito.

(317) **Belvedere Cove**, 3 miles NNE of the Golden Gate Bridge, is entered between **Peninsula Point** on the S and **Point Tiburon** on the N. Two private yacht clubs are in the cove. There are several small piers used by ferry boats about 0.2 mile W of Point Tiburon. Passenger ferry service is available between Tiburon and San Francisco and between Tiburon and Angel Island. The ruins of an abandoned railroad ferry slip is just W of Point Tiburon.

(318) **Angel Island**, 3 miles NE of the Golden Gate Bridge, is partially wooded and level on top. The irregular-shaped island is separated from the mainland by Raccoon Strait. The island, formerly an immigration detention station, is now a State park. A ferry operates from the island to Tiburon and just S of Pier 1 in San Francisco.

- (319) **Point Blunt**, the SE extremity of Angel Island, terminates in a 60-foot-high knob, and is connected with the island by a low neck of land. **Point Blunt Light** (37°51'12"N., 122°25'09"W.), 60 feet above the water, is shown from a white house on the point; a sound signal is at the station. A shoal with visible and covered rocks extends SSE for 0.1 mile. Tide rips and swirls are heavy around the point, especially with a large falling tide.
- (320) **Quarry Point**, the E end of Angel Island, is a bold bluff with deepwater close-to. The wharf 0.6 mile N of the point is in ruins. The point is marked by a light.
- (321) A lighted buoy is off **Point Stuart**, the W extremity of Angel Island. A shoal area covered 14 to 30 feet, extending SW from **Point Knox**, is marked by a lighted buoy.
- (322) **Ayala Cove**, indenting the N side of Angel Island, about 0.6 mile NE of Point Stuart, is reported to afford good anchorage in depths of 10 to 12 feet, mud bottom, and protection from S and W winds. Slips are available for day use only; mooring buoys are available for overnight stays. A pier at the State park facility in the cove is used by ferries and State park personnel.
- (323) **Raccoon Strait**, nearly 0.5 mile wide between Angel Island and the mainland, is used by ferry boats and pleasure craft. The tidal currents in the strait have considerable velocity, and rips and swirls are heavy at times. A midchannel course can be followed. **Raccoon Shoal**, covered 29 feet, is 500 yards N of Raccoon Strait Lighted Buoy 4. A strong ebb current sets directly across the channel at the E entrance.
- (324) The charted **recreation area** extending SW of Angel Island and including all of Raccoon Strait and Richardson Bay is intended primarily for use by recreation vessels. It should not be utilized by vessels 300 tons or more for through passage or for any other purpose, except in case of emergency or special circumstances.
- (325) **Bluff Point**, on the mainland and marked by a light, is the E extremity of Tiburon Peninsula 1.2 miles N of Point Stuart. Point Chauncey, 0.8 miles NW of Bluff Point, is the site of the University of San Francisco Romberg Fisheries Laboratory as well as NOAA's Tiburon Fisheries Laboratory. Pier ruins at the site are marked by lights.
- (326) **Paradise Cay**, a filled real estate project 2.6 miles NW of Bluff Point, has a small-boat harbor that accommodates about 200 boats. The harbor is on the N side of the project.
- (327) **Corte Madera Creek**, at the head of a marshy bight about 2 miles NW of Paradise Cay, is the site of a ferry terminal with frequent service to and from San Francisco.
- (328) **Corte Madera Channel** leads NW from deep water in the bay over the flats to a turning basin at the mouth of the creek. In 2011, the controlling depth in the entrance channel was 11 feet, thence 13 to 14 feet in the turning basin. The channel and turning basin are marked by lights.
- (329) A railroad bridge, 0.4 mile above the turning basin, has a 38-foot bascule span with a clearance of 10 feet. (See **117.1 through 117.59 and 117.153**, chapter 2, for drawbridge regulations.) The bridge remains in the open position except when trains or rail maintenance equipment are crossing the creek. The fixed highway bridges, 0.1 mile above the railroad bridge, have 35-foot channel spans with a clearance of 21 feet. Submerged obstructions that protrude 3 to 4 feet from the bottom are under the fixed bridges. The obstructions are marked by signs on either side of the bridges. In 1984, a submerged obstruction was reported on the N edge of the channel about 400 yards W of the fixed bridges. The power cables over the turning basin and creek have a least clearance of 120 feet.
- (330) **Point San Quentin**, at the W end of the Richmond-San Rafael Bridge, has low land on either side. The buildings of the State Prison S of the bridge and the long wharf N of it are prominent. A State **security zone** extends off the SE side of Point San Quentin. The buoys are orange and white and display the words "San Quentin Prison."
- (331) **San Rafael Creek**, 1.8 miles NW of Point San Quentin, is used by many small craft basing at the city of **San Rafael**. A dredged channel leads across the flats of **San Rafael Bay** into San Rafael Creek to the Grand Avenue bridge, about 1.2 miles above the mouth; a turning basin is on the S side of the channel just below the bridge. In 2011-2012, the controlling depth was 4 feet at midchannel from the channel entrance to mouth of the creek, thence 2 feet at midchannel to the turning basin, with 2 feet in the basin. The channel entrance is marked by lights and a **293°** lighted range. The overhead power cables near the entrance to the creek have a clearance of 125 feet. The Grand Avenue Bridge has a 30-foot fixed span with a clearance of 4 feet.
- (332) The municipal yacht harbor is on the S side of San Rafael Creek, about 400 yards E of the turning basin, and there are numerous small-craft facilities elsewhere along the creek. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)
- (333) **Point San Pedro**, 3 miles N of Point San Quentin at the W entrance to San Pablo Bay, extends 100 yards E of 356-foot-high **San Pedro Hill**. Three charted brick stacks are just S from the point. There is a large quarry just N from the point.

Charts 18654, 18652, 18658

- (334) **San Pablo Bay**, is nearly circular, 10 miles long in a NE direction, with a greatest width of 8 miles. The N part consists of low marshes intersected by numerous sloughs and a large area of shoal water and mudflats that bare at extreme low water. The S shore is bolder, except between Point San Pablo and Pinole Point, where it is low and marshy for about 3 miles. Carquinez Strait joins San Pablo Bay with Mare Island Strait and Suisun Bay

at its E extremity. There is considerable traffic through the bay. Deep-draft oil tankers and sugar-laden vessels pass through the bay bound for Crockett and Martinez. Lighter draft vessels pass through bound for points on Suisun Bay, and the Sacramento River to Sacramento, and on the San Joaquin River to Stockton.

(335) Mariners are advised that winds and currents in San Pablo Bay may be particularly strong and must be taken into consideration by tankers bound for the oil terminals. Vessels transiting the Pinole Shoal Regulated Navigation Area westbound on an ebb current should use extra caution to avoid being set down on the aids to navigation following the turn at San Pablo Bay Channel Light 11.

(336) The marked channel through San Pablo Bay extends in a gentle curve N and E from the entrance to the E end. The Federal project depth is 35 feet across Pinole Shoal. (See Notice to Mariners and latest editions of charts for controlling depths.) A **regulated navigation area** has been established in Pinole Shoal Channel. (See **33 CFR 165.1181(e)(2)**, chapter 2, for limits and regulations.) Vessels that do not meet the tonnage requirements to transit the Pinole Shoal Regulated Navigation Area (**165.1181**) follow an informal transit pattern along the 25-foot curve just to the south of Pinole Shoal between San Pablo Bay Channel Lighted Buoy E and the entrance to Carquinez Strait.

(337) A **regulated navigation area** has been established in San Pablo Bay N of the Pinole Shoal Channel. (See **33 CFR 165.1184**, chapter 2, for limits and regulations.)

(338) **General and naval anchorages** are in San Pablo Bay. (See **110.1 and 110.224**, chapter 2, for limits and regulations.)

(339) Shoals and flats, which uncover, extend from Point San Pablo to Pinole Point, thence NE to Lone Tree Point.

(340) **Pinole Point** is a moderately high, rocky bluff, projecting about 1 mile from the SE shore of San Pablo Bay. A T-head fishing pier extends NW from the E side of the point. Piles and a light are off the face of the pier. The ruins of a former wharf extend from the E side of the point, and numerous oil tanks are on the hills about 2 miles in back of it. About 3.5 miles E of Pinole Point, the black and white tank at a chemical fertilizer plant is prominent. A pleasure fishing pier and a small-craft harbor are at **Lone Tree Point**, 4.6 miles E from Pinole Point. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.) A steel skeleton tower is 0.6 mile S of Lone Tree Point. **Oleum**, on **Davis Point**, is an oil town. There are many prominent oil tanks, painted in pastel colors, on the hills back of the town. Six stacks in a line SE of Davis Point are also prominent.

(341) The Conoco-Phillips Wharf, a T-shaped wharf, extends out from the Oleum refinery on Davis Point. In 2005, a least depth of 40 feet was alongside the 1,250-foot wharf; 1,375 feet of berthing space is available with

dolphins. All four corners of the wharf are marked by private lights, and a private sound signal is at the E end; the trestle leading to the wharf is lighted at night. The deck height is 17 feet. Pipelines extend from the wharf to nearby storage tanks. The wharf is used for receipt and shipment of petroleum products and for bunkering vessels. A **security zone** has been established surrounding the wharf. (See **165.1197**, chapter 2, for limits and regulations.)

(342) Shore Oil Terminal Wharf, about 1 mile E of the Conoco-Phillips wharf, has a 72-foot face with 980 feet of berthing space with dolphins and 40 to 45 feet alongside; deck height, 20 feet. The wharf is used for receipt of petroleum products

(343) **Gallinas Creek** enters San Pablo Bay about 1.5 miles NW of Point San Pedro. The entrance channel, marked by private markers on the N side, leads across flats to the mouth of the creek. In 1983, the channel had a controlling depth of 2 feet. Local knowledge is advised. Overhead cables crossing the creek have a minimum clearance of 65 feet.

(344) A dredge offloading facility and booster pump facility are about 1.43 miles NE of Point San Pedro in about 38°00'22"N., 122°25'53"W. and 38°01'15"N., 122°27'04"W., respectively. The two facilities consist of several pilings with permanently moored barges. A marked, submerged pipeline and power cables connect the two facilities, thence runs NW to the shoreline in about 38°02'47"N., 122°29'36"W. Mariners are advised to use caution when transiting the area.

(345) **Petaluma River** enters San Pablo Bay on the NW side. The city of **Petaluma**, 12 miles above the mouth, is the center of an extensive dairy and egg industry. The river is used by pleasure craft and by barges handling gravel, oyster shell, heavy construction equipment, and prestressed concrete products.

(346) A dredged channel leads from deep water in San Pablo Bay to the mouth of the Petaluma River and continues upstream to the city of Petaluma. A Federal project provides for depths of 8 feet in the entrance and through the river to a turning basin at Petaluma, thence 4 feet to the upstream limit of the project. (See Notice to Mariners and latest edition of the chart for controlling depths.)

(347) Least clearances over Petaluma River are: drawbridges, 4 feet; fixed bridges, 8 feet; and power cables, 70 feet. The bidgetender for the D Street highway bridge at Petaluma monitors VHF-FM channel 16, and works channel 9; call sign: WQX 644, D Street Bridge. When not in use, the drawspans of the railroad bridges at Black Point and Haystack Landing are maintained in the open to navigation position. (See **117.1 through 117.59 and 117.187**, chapter 2, for drawbridge regulations.)

(348) A privately dredged channel with private markers leads SSW from the dredged entrance channel to Petaluma River just below the entrance to the river and

thence to **Novato Creek**. In 1985, the reported controlling depth was 2 feet.

Danger zones

- (349) Danger zones are in the E part of San Pablo Bay adjacent to the W shore of Mare Island and in the N central part of the bay. (See **334.1160** and **334.1170**, chapter 2, for limits and regulations.)

Charts 18655, 18652

- (350) **Mare Island Strait**, at the mouth of the Napa River, is between the mainland and **Mare Island**. The project depth for the Mare Island Strait Channel, from the entrance to just S of the Vallejo-Mare Island Causeway Bridge, about 2.9 miles above the entrance, is 30 feet. (See Notice to Mariners and latest editions of charts for controlling depths.)

- (351) The waters around Mare Island are included in a **restricted area**. (See **334.1100**, chapter 2, for limits and regulations.)

- (352) In 2010, shoaling to 14 feet was in the NW corner of Naval Anchorage 21, with shoaling to 5 feet in the adjacent Disposal Area.

- (353) A power cable crossing lower Mare Island Strait between Vallejo and Mare Island has a clearance of 206 feet. If the clearance between the masthead and the cable is less than 10 feet or if the clearance is not known, vessels shall not move under the cable without authority.

- (354) The entrance to Mare Island Strait is between two dikes. On the E side of the entrance, Dike No. 9 extends about 700 yards SW from the mainland and on the W side, Dike No. 14 extends about 500 yards SE from Mare Island; both dikes have submerged outer sections. Dike No. 9 is marked at the outer end by a light and Dike No. 14 is marked at the outer end by a lighted buoy.

Coast Guard

- (355) **Coast Guard Station Vallejo**, about 2.5 miles above the entrance to Mare Island Strait just below the Vallejo-Mare Island causeway lift bridge, is on the E side of the strait.

- (356) **Vallejo**, on the E shore of Mare Island Strait, is the terminal of a railroad connecting interior N points. A large flour mill is prominent S of the railroad yard. A passenger ferry operates between Vallejo and San Francisco.

- (357) Two small-craft facilities are also on the E side of the Mare Island strait. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

- (358) The Vallejo-Mare Island causeway and lift bridge connects Mare Island with the city of Vallejo. It has a lift span with a clearance of 100 feet up and 12 feet down. (See **117.1 through 117.59** and **117.169**, chapter 2, for

drawbridge regulations.) The bridge is equipped with radiotelephone. The bridgetender monitors VHF-FM channel 16 and works on channel 13; voice call, Mare Island Causeway Bridge. Just above **Sears Point**, 1 mile above Vallejo, a fixed highway bridge with a clearance of 100 feet crosses the strait. A public fishing pier is close S of this bridge and extends about 350 yards from the E side of the strait. A Navy reserve fleet pier is on the W side of the strait between Vallejo-Mare Island causeway lift bridge and the fixed bridge just above Sears Point. If practical, approach the bridges only when running against the current. No passage should be attempted during the periods of peak flood or ebb current.

Charts 18654, 18652

- (359) **Napa River**, the continuation of Mare Island Strait above the Vallejo-Mare Island Causeway Bridge, is used by barges and pleasure boats. Barge traffic on the river is in crushed rock, salt, and steel. A dredged channel leads from the causeway bridge to a turning basin at **Jacks Bend**, thence to the head of navigation at the 3rd Street Bridge in **Napa**, 13 miles above the causeway bridge. A **Federal project** provides a depth of 10 feet from **Horseshoe Bend** to the upstream limit of the channel. (See Notice to Mariners and latest editions of charts for controlling depths.) Napa River is marked to Horseshoe Bend by lights and a daybeacon; above Horseshoe Bend, the river is marked by lights and daybeacons to the 3rd Street Bridge in Napa. A visible wreck, marked by a buoy, is on the E side of the channel just N of Slaughterhouse Point. In 2004, a submerged obstruction was reported in the channel E of Knight Island in about 38°08'16.5"N., 122°16'57.2"W.

- (360) The railroad bridge across Napa River at **Brazos**, about 6.8 miles above the Vallejo-Mare Island Causeway, has a vertical lift span with a clearance of 2 feet down and 97 feet up. When not in use, the drawspan is maintained in the open to navigation position. (See **117.1 through 117.59** and **117.169**, chapter 2, for drawbridge regulations.) The channel through the bridge crosses from one bank to the other causing a hazardous condition, particularly for downbound loaded barges, because the direction of the ebb current is as much as 50° from the axis of the channel.

- (361) A fixed highway bridge with a clearance of 107 feet crosses the Napa River at Suscol, about 9.7 miles above the Vallejo-Mare Island Causeway.

- (362) Near **Imola**, 12 miles above Vallejo-Mare Island Causeway bridge, a fixed highway bridge crosses the river with a clearance of 60 feet. The three fixed bridges in Napa have a minimum width of 47 feet and a clearance of 3.7 feet. The minimum clearance of the power cables crossing the river below Napa is 125 feet, and in Napa, 40 feet.

- (363) A small-craft basin is on the W side of Napa River opposite **Bull Island**, 8 miles above the Vallejo-Mare



Carquinez Strait, California
Image courtesy of U.S. Army Corps of Engineers

Island Causeway, and several other small-craft facilities are elsewhere on the river. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Charts 18656, 18652

(364) Six-mile-long **Carquinez Strait** connects San Pablo and Suisun Bays. For the first 3.5 miles it is a little less than 0.5 mile wide, and then widens to about 1 mile. It is deep throughout with the exception of a small stretch of flats on the N shore, and a small shoal area in the bight on the S shore near the E end.

Anchorage

(365) **General anchorages** are in Carquinez Strait. (See **110.1** and **110.224**, chapter 2, for limits and regulations.)

Charts 18655, 18652

(366) The **California State Maritime Academy** and pier are in **Morrow Cove**, on the N shore of the W entrance to Carquinez Strait.

(367) Interstate Route 80 fixed highway bridges cross Carquinez Strait near its W entrance at **Semple Point**. The channel on each side of the center pier is 998 feet wide; the least clearance is 146 feet through the N span

and 132 feet through the S span. Private sound signals are sounded at the bridge piers and racons are at the center of each span of the E bridge.

(368) Power cables cross the strait 0.3 mile W of the highway bridges and 1.2 miles E of it; the minimum clearance is 179 feet.

(369) **Crockett**, on the S shore just E of the highway bridges, is built around The California and Hawai'ian Sugar Co. Refinery. The refinery's wharf has a 2,715-foot face with 2,815 feet of berthing space with dolphins, and a deck height of 12 feet. A depth of 30 feet is alongside. Four cranes and a conveyor system serve the wharf, maximum unloading rate is 250 tons per hour each; water is available. The wharf is used for receipt and shipment of sugar products and the transfer of bulk liquid molasses; it is owned and operated by California and Hawai'ian Sugar Co.

(370) A marina is on the S shore just W of the highway bridges, and a small-boat basin is in **Elliot Cove** on the N side of the strait opposite Crockett. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Charts 18657, 18652

(371) A light is 130 yards off the S side of Carquinez Strait, 1.5 miles E of Interstate Route 80 fixed highway bridges; a light is off **Port Costa**, 0.6 mile to the E. On

the N side of the strait, a light is on **Dillon Point** and another is off **Benicia Point**.

- (372) The Defense Fuel Supply Center Support Point, Ozol Oil Wharf, at **Ozol**, is about 1.6 miles SE of Port Costa. The 270-foot offshore wharf, marked by lights on the E and W ends, has 880 feet of berthing space with dolphins; 37 feet alongside; deck height is 8 feet; water and electrical shore power connections are available; it is owned by the U.S. Government and operated by Blaiz Co., Inc.
- (373) There are three wharves extending out to deep water at **Martinez**, 2 miles SE of Point Carquinez.
- (374) The westernmost of these facilities is the municipal fishing pier with a tugboat slip on its W side. A small-boat harbor, protected by breakwaters, is on the E side of the pier. A private light is on the channel end of both breakwaters. In 1994, shoaling to a depth of about 4 feet was reported at the entrance to the marina.
- (375) The Shell Oil Co., Martinez Refinery Wharf, E of the municipal fishing pier, is a 900-foot offshore wharf, 1,850 feet usable with dolphins; depth of 42 feet alongside decreasing to 39 feet at the W end; deck height is 15 feet; water and electrical shore power connections are available; owned and operated by Shell Oil Co. The wharf is marked by private lights and a sound signal. A **security zone** has been established around the wharf. (See **165.1197**, chapter 2, for limits and regulations.)
- (376) The Tesoro Amorco Pier, Upper and Lower Wharves, 400 yards E of the Shell Oil Co. Wharf, have depths of 35 feet alongside and both are used for bunkering vessels as well as the receipt and shipment of petroleum products. The W wharf is a 76-foot offshore wharf with 281 feet usable with dolphins; depth of 35 feet alongside; deck height is 15 feet. The E wharf is a 76-foot offshore wharf with 512 feet usable with dolphins; deck height is 17 feet. The wharves provide 978 feet of continuous berthing space; owned and operated by Tesoro Corporation. Both wharves are marked by private lights. A **security zone** has been established around the wharves. (See **165.1197**, chapter 2, for limits and regulations.)
- (377) **Benicia** is on the N shore at the E end of Carquinez Strait. Most of the smaller piers around the town are in ruins.
- (378) A marina, protected by breakwaters, is at Benicia. Private lights on the breakwater mark the entrance. (See the small-craft facilities tabulation on Chart 18652 for services and supplies available.)
- (379) In 1988, a sunken wreck with a least depth of 21 feet was reported about 600 yards WSW of the Port of Benicia in about 38°02'17.5"N., 122°08'39.6"W.
- (380) The **Port of Benicia** is at Army Point at the E end of the town. Highway and railroad connections, and water and electrical shore power connections are available at all of the facilities.
- (381) Valero-Benicia Refinery (38°02'41"N., 122°07'45"W.): 1,100 feet of berthing space; 40.4 feet alongside; deck height, 15 feet; receipt and shipment of petroleum products; receipt of crude oil; owned and operated by Valero Energy Corporation. A **security zone** has been established around the wharf. (See **165.1197**, chapter 2, for limits and regulations.)
- (382) Benicia Industries, Wharf No. 95 (38°02'28"N., 122°08'05"W.): 2,404 feet of berthing space; 38 feet alongside; deck height, 11 to 15 feet; receipt of automobiles and crude oil; receipt and shipment of general cargo; shipment of bagged rice, petroleum coke, and petroleum products; owned by Benicia Industries, Inc., and operated by various companies.
- (383) Three bridges cross Carquinez Strait at the E end from **Army Point** to **Suisun Point**. The Benicia-Martinez Highway Bridge has a fixed span with a clearance of 135 feet over Suisun Point Reach. A sound signal and RACON are over the main channel span between piers 10 and 11 and a sound signal is between piers 6 and 7. The Union Pacific Railroad Bridge, just E of the fixed bridge, has a lift span with clearances of 70 feet down and 135 feet up over the main channel. The I-680 Highway Bridge, 0.1 mile E of the railroad bridge, has a fixed span with a clearance of 153 feet over Bulls Head Channel. (See **117.1** through **117.49**, chapter 2 for drawbridge regulations.) The bridgetender monitors VHF-FM channel 13 and works on channel 14; call sign KQ-7193, Union Pacific Railroad Bridge. All mariners intending to transit underneath the Union Pacific Railroad Bridge should be familiar with the communications protocol established specifically for vessel-to-bridge radiotelephone communications at the bridge. The protocol addresses procedures for requesting an opening of the bridge as well as special emergency communication procedures for all vessels transiting underneath the bridge. For a complete explanation of the San Francisco communications protocol, or to contact the Training Director, go to <http://www.uscg.mil/d11/vtssf/>.
- (384) **Bulls Head Point**, just E of the S end of the bridge, shows as a 100-foot rounding hill with a prominent high white stack.
- (385) The Tesoro Corporation, Avon Refinery Wharf extends across the flats at **Avon**, 1.5 miles E of the Suisun Point bridges. Total berthing space is 1,320 feet; depths alongside the channel face are 32 feet; deck height is 19 feet, with 14 feet at the center section. Tankers berth along the channel side of the face, and barges along the inshore side of the face; receipt and shipment of petroleum products; owned and operated by Tesoro Corporation. Private lights and sound signals are on the outer ends of the pier. A **security zone** has been established around the wharf. (See **165.1197**, chapter 2, for limits and regulations.)
- (386) The Shore Oil Terminal Wharf, 970 feet of berthing space with dolphins, is 0.5 mile W of the Tesoro Wharf; depth alongside, 34 feet; receipt and shipment of petroleum products. The wharf is owned and operated by Shore Terminals Oil Corp.

Charts 18656, 18652

(387) **Suisun Bay** is a broad shallow body of water with marshy shores and filled with numerous marshy islands, many of which have been reclaimed and are now under cultivation. It is practically the delta of the Sacramento and San Joaquin Rivers which empty into the E part of the bay. Two narrow winding channels lead to the mouths of the rivers. They are marked by lights. The rivers and the channels near the mouths have been improved by the Government to increase the depth, remove obstructions, and provide relief during freshet seasons. A **Federal project** provides for a main channel 35 feet deep through the bay to the San Joaquin River. (See Notice to Mariners and latest editions of charts for controlling depths.)

(388) The bay is used by many light-draft vessels having local knowledge. It is recommended that large vessels take a pilot if bound above Crockett. For information on obtaining an inland pilot contact the San Francisco Marine Exchange or San Francisco Bar Pilots.

Anchorage

(389) **General anchorages** are in Suisun Bay. (See **110.1 and 110.224**, chapter 2, for limits and regulations.) Mariners are advised that a cable area runs through Anchorage No.23.

(390) **Suisun Slough** empties into the NW side of Suisun Bay 5.5 miles N of Benicia. A dredged channel leads from Suisun Bay into the entrance to the slough. In 1990, the controlling depth was 6½ feet. The entrance channel is marked by lights. Above the dredged channel, river channel had a reported depth of 6.3 feet in 2001, from the mouth to **Suisun City**, 12 miles above the entrance. Traffic on the slough includes gasoline, jet fuel, and residual fuel oil. Petroleum products are barged to an oil distributor at Suisun City. A power cable with a clearance of 110 feet crosses the slough just S of the city.

(391) A **restricted berthing area** for Maritime Administration Reserve Fleet vessels is along the W side of Suisun Bay. (See **162.270**, chapter 2, for limits and regulations.)

(392) (See **117.1 through 117.59, 117.151, and 117.185**, chapter 2, for drawbridge regulations for the bridges over the minor tributaries of Suisun Bay.)

Charts 18658, 18652

(393) The site of the **Concord U.S. Naval Weapons Station** is on the S side of the bay. A **restricted area** has been established along the waterfront of the Naval Station (See **33 CFR 334.1110**, chapter 2, for limits and regulations.) A **security zone** has also been established around the piers of the Naval Station. (See **33 CFR 165.1199**, chapter 2, for limits and regulations.)

Charts 18656, 18652

(394) Two adjacent small-craft basins are on the S side of the flats about 1.6 miles E of **Middle Point**, the E boundary of the Navy weapons station. The basins are connected to the bay by twin canals cut through the flats.

Charts 18659, 18661, 18652

(395) **Pittsburg**, on the S side of New York Slough 12 miles E of Suisun Point bridges, is a manufacturing city with several deepwater berths.

(396) The PGE-Pittsburg Fuel Pier, about 0.3 mile W of **New York Point**, is an offshore wharf with 1,070 feet of berthing space, 35 feet alongside, and a deck height of 14 feet. It is used for receiving and transshipping petroleum products.

(397) The Diablo Service Corp. Wharf, about 0.6 mile E of New York Point is an offshore wharf with 1,154 feet of berthing space with dolphins, 35 feet alongside, and deck height of 12 feet. There is a conveyer system and crawler tractors. Rail and highway connections, and water and electrical shore-power connections are available. It is owned by Tosco Corp. and is used for the receipt of petroleum coke.

(398) USS-Posco Industries, Pittsburg Wharf, about 1.3 mile E of New York Point, is a 891-foot marginal wharf with depths of 33 feet alongside and a deck height of 11 feet. Three 37½-ton cranes are available, and there are rail and highway connections, and water and electrical shore power connections. It is used for receipt of semi-finished steel.

(399) The Dow Chemical Co., Pittsburg Plant Wharf, about 2 miles E of New York Point, is an offshore wharf with 672 feet of berthing space with dolphins, 40 feet alongside and a deck height of 20 feet. It is used for shipment and receipt of caustic soda.

(400) **Antioch** on the S side of San Joaquin River 16 miles E of Suisun Point bridges, is a manufacturing city with waterborne commerce.

(401) Georgia-Pacific Corp., Antioch Plant Wharf, about 38°00'56"N., 121°47'08"W., is a 197-foot offshore wharf, 780 feet usable with dolphins, with 31 feet alongside and a deck height of 11 feet. A conveyor system is available for the receipt of gypsum rock. Highway connections, and water and electrical shore power connections are available.

(402) Gaylord Container Corp., California Mill Wharf, about 0.5 mile E of Kaiser Gypsum Co. Pier, is a 291-foot offshore wharf, 766 total berthing space, with depths of 35 feet alongside. Receipt of miscellaneous dry bulk commodities.

(403) There are also barge facilities at Antioch.

(404) The Fulton Shipyard, on the E edge of the city, has a marine railway that can haul out vessels up to 350 tons

Structures Across the Principal Tributaries of the San Joaquin River						
	Location	Clear Width of Draw or Span Opening (feet)	Clear Height above Water Datum (feet)		Information	
			Low	High		
Mokelumne River						
1	Mokelumne River highway swing bridge	38°07'34"N., 121°34'47"W.	100	11	8	Bridgtender monitors VHF-FM channel 16 and works channel 9; call sign KMJ-382 Mokelumne River Bridge. (Note 1)
South Fork Moke-						
2	Overhead power cable	38°07'04"N., 121°29'44"W.			110	
3	Overhead power cable	38°13'32"N., 121°29'30"W.			110	
4	San Joaquin County highway bridge (removable span)	38°13'32"N., 121°29'30"W.	58	16	13	(Note 1)
North Fork Moke-						
5	Millers Ferry highway swing bridge	38°13'25"N., 121°30'25"W.	85	15	12	Bridgtender monitors VHF-FM channel 16 and works channel 9; call sign WBE-8326 Millers Ferry Bridge. (Note 1)
6	Wilson Bridge/Dead-horse Island Bridge (removable span)	38°13'28"N., 121°30'17"W.	56	14	11	
Mokelumne River						
7	Interstate 5 fixed highway bridges	38°15'18"N., 121°26'52"W.	65	24	21	
8	Franklin Road swing bridge	38°15'20"N., 121°26'23"W.	80	21	18	Clearances are for the south draw only. (Note 1)
9	Union Pacific Railroad swing bridge	38°15'17"N., 121°25'54"W.	61	19	16	Clearances are for the south draw only. (Note 1)
10	Galt-New Hope Road fixed bridge	38°14'12"N., 121°25'07"W.	62	18	2	
Little Potato Slough						
11	Potato Slough (swing, highway) Bridge	38°06'56"N., 121°29'52"W.	100	37	35	Bridgtender monitors VHF-FM channel 16 and works channel 9; call sign KSK-278 Potato Slough Bridge. (Note 2)
Georgiana Slough						
12	Overhead power cable	38°08'47"N., 121°36'03"W.			85	
13	Tyler Island (swing) Bridge Road	38°09'43"N., 121°35'05"W.	80	13	10	Bridgtender monitors VHF-FM channel 16 and works channel 9; call sign WHU-246 Tyler Island Bridge. (Note 3)
Old River						
14	Overhead power cable	38°04'16"N., 121°34'32"W.			110	
15	Overhead power cable	37°58'57"N., 121°34'53"W.			110	
16	BNSF Railroad Bascule Bridge	37°56'24"N., 121°33'38"W.	95 (75 feet open)	14	11	Bridgtender monitors VHF-FM channel 16 and works channel 9; call sign WHU-322 Santa Fe Railroad Bridge.
17	Overhead power cable	37°55'44"N., 121°33'32"W.			125	
18	State Route 4 highway swing bridge	37°53'28"N., 121°34'13"W.	98	16	12	(Note 4)

Structures Across the Principal Tributaries of the San Joaquin River						
		Location	Clear Width of Draw or Span Opening (feet)	Clear Height above Water Datum (feet)		Information
				Low	High	
19	Overhead power cable	37°53'13"N., 121°34'32"W.			50	Cable is temporary with estimated duration through April 2011; vertical clearance is approximate.
20	Old River Fixed Bridge	37°50'36"N., 121°32'16"W.	24	18	14	
21	Overhead power cable	37°50'36"N., 121°32'16"W.			110	
22	Overhead power cable	37°50'21"N., 121°32'20"W.			115	
23	Overhead power cable	37°49'44"N., 121°33'09"W.			110	
24	Overhead power cable	37°49'08"N., 121°33'15"W.				data unavailable
25	Overhead power cable	37°48'54"N., 121°33'11"W.			26	
26	Overhead power cable	37°47'26"N., 121°30'51"W.				data unavailable
27	Tracy Boulevard Fixed Bridge	37°48'16"N., 121°26'59"W.	46	18	15	
28	Overhead power cable	37°48'28"N., 121°24'36"W.			110	
	Junction with San Joaquin River	37°48'30"N., 121°19'39"W.				
Middle River						
29	Bacon Island Swing Bridge	37°57'23"N., 121°31'41"W.	37' 90 ²	18' 11 ²	15' 8 ²	¹ Clearances for west span ² Clearances for east span Bridgetender monitors VHF-FM channel 16 and works channel 9; call sign WHU-8326 Bacon Island Bridge. (Note 5)
30	Overhead power cable	37°56'33"N., 121°31'57"W.			110	
31	BNSF Railroad Bascule Bridge	37°56'23"N., 121°32'00"W.	85 (79 feet open)	14	11	(Note 5)

for general repairs. The yard repairs auxiliary vessels such as towboats and barges.

(405) Several small-craft facilities are at Pittsburg and Antioch. (See the small-craft facilities tabulation on chart 18652 for services and supplies available.)

Charts 18661, 18662

(406) The **Delta Region**, the combined deltas of the San Joaquin and Sacramento Rivers, comprises the feeder rivers, sloughs, and canals that directly or indirectly connect with one or both of the rivers. Hundreds of miles of navigable waterways for small boats are available in the Delta; both local and visiting small craft use these waterways extensively. Common types of pleasure craft peculiar to the Delta include pontoon boats and houseboats, but many conventional powerboats and sailboats use these waters also, especially in summer when San Francisco Bay is foggy and choppy. Some

of the more important sloughs are used by tugs and barges.

(407) Bordering the various waterways are levees which are 12 feet or more higher than the land behind them. The levees are built up from dredged material taken from the adjacent waterway, and because of the settlement of the levees, dredging has been done periodically to keep the tops at height and grade. As material is needed for levee work, the dredge pays more attention to the requirements of the levee than to the depth of the channel for navigation purposes. This leaves an uneven bottom. The tops of the levees generally have dirt roads. **Tule** is often found on the channel side of the levees. Tule is the name given to a tall aquatic plant growth similar to bulrush.

(408) Many public and private small-boat harbors, marinas, and boating resorts are spread over the Delta region. All types of facilities and services for small craft are available, though some areas in the Delta are much more developed than others. Groceries are one of the most difficult items to obtain in this region; groceries

in any quantity must be obtained from the larger towns on the Sacramento River, at Antioch or Stockton on the San Joaquin River, or at one of the larger resorts. Diesel oil is similarly rather scarce, since most craft on these waters use gasoline. Diesel oil may be obtained at the junction of the Mokelumne and San Joaquin Rivers, on the W side of King Island, at or near the cities of Antioch and Stockton, and at Bethel Island.

- (409) Some areas in the Delta in which small-craft facilities are especially concentrated are: most of the perimeter of **Bethel Island (Bethel Tract)**, 3.4 miles E from Antioch Bridge; the S side of San Joaquin River on both sides of Antioch Bridge; the W side of the Mokelumne River from its junction with the San Joaquin River to Georgiana Slough; and the San Joaquin River from Fourteenmile Slough through Stockton. (See the small-craft facilities tabulation on charts 18661 and 18662 for services and supplies available at the small-craft facilities in the Delta Region.)

Cable ferries

- (410) The Sacramento and San Joaquin Rivers, including some of the feeder rivers, sloughs, and canals that directly or indirectly connect with one or both of the rivers, are crossed by cable ferries (see charts 18661 and 18662). These ferries in the delta region are guided by cables and sometimes propelled by a cable rig attached to the shore. Cables to the ferries, which extend from both banks of the waterway, may be at, near, or above the water surface. Operating procedures vary and mariners are advised to use extreme caution and seek local knowledge. In 1978, the U.S. Coast Guard advised that cable ferries were not operating in many charted locations in the delta region. These ferries may operate intermittently, so caution is advised while operating in their vicinity. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

- (411) **Clearances for structures** (bridges, cables, pipelines, etc.) across all navigable waterways throughout the **Delta Region** (except the San Joaquin River) are listed on structure-crossing tables. These tables are located near the waterways being discussed in the text. Mariners are advised that **low water datum** listed on the tables is **mean lower low water at low-river stage**; overhead cable clearances reference **high water datum**. During **flood stage levels**, bridge and overhead cable clearances may be **reduced** as much as 29 feet or more. See chapter 1 for more information about bridges and overhead cables.

Charts 18661, 18660, 18663

- (412) **San Joaquin River** rises in the Sierra Nevada, flows 275 miles in a W direction, and enters Suisun Bay through **New York Slough**. The winding river is navigable for deep-draft vessels to Stockton. The water is

generally fresh at Antioch. Major floods in the river valley may occur from November to April, caused by intense general storms of several days' duration. At the mouth of the river an ordinary flood will cause a rise of 8 feet and an extreme flood a rise of 10 feet in the river level. At Stockton, ordinary flood will cause a rise of 8.5 feet, and extreme flood a rise of 13.5 feet in the river level. The delta of the river is formed of many marshy islands intersected by sloughs and channels. The islands are reclaimed tule and cattail marshes which have been converted to agriculture. Bordering the river are levees that are 12 feet or more higher than the land behind them.

- (413) Reports of gage heights of the San Joaquin River delta can be obtained from the Sacramento National Weather Service Office at any time. The information is published in the Sacramento Bee and, in addition, is reported on radio broadcasts from station KFBK (1530 kHz) whenever the gage heights are sufficient to be of general interest.

- (414) Information on gage heights can also be obtained from the State Department of Water Resources, 1416 9th Street, Sacramento, CA 95814 or by recorded message at (916) 653-6416.

- (415) A **Federal project** provides for a 35-foot channel from the mouth of the San Joaquin River to a turning basin at Stockton, and for suitable passing and turning basins. (See Notice to Mariners and latest editions of charts for controlling depths.)

Anchorage

- (416) **General and explosives anchorages** are in the San Joaquin River on the W side of Sherman Island near the mouth, and just N of Venice Cut between Mandeville Island and Venice Island. (See **110.1** and **110.224**, chapter 2, for limits and regulations.)

- (417) (See **162.205**, chapter 2, for rules and regulations governing maximum speed, passing, right-of-way, collision, and wrecks in the San Joaquin River.)

- (418) **Antioch Bridge**, (State Route 160), a fixed highway bridge with a clearance of 142 feet, crosses San Joaquin River about 3 miles E of Antioch. There are no other bridges over the main channel below the turning basin at Stockton. Power cables over the main channel of San Joaquin River from the mouth to the turning basin at Stockton have a minimum clearance of 140 feet.

- (419) There are small-craft facilities on the S side of San Joaquin River on both sides of Antioch Bridge. (See the small-craft facilities tabulation on chart 18661 for services and supplies available.)

- (420) The main channel in San Joaquin River to Stockton is marked by a daybeacon, buoys, lights, and lighted ranges. At **Mandeville Cut** and **Venice Cut**, 15 miles above Antioch Bridge, the river still follows its old channel and violent sheers are experienced if the navigator is not prepared to meet the river current when passing

from the cuts into the river and from the river into the relatively quiet waters of the dredged channel. Under freshet conditions, vessels tend to sheer off course at the junction of the San Joaquin River and the main ship channel at Channel Point near Stockton.

- (421) **Stockton**, 28 miles above Antioch Bridge, is in the center of the fertile San Joaquin Valley. The deep-draft harbor is near the W city limits.

Bridges

- (422) A fixed highway bridge with a clearance of 45 feet at high water (50 feet at low water) crosses the upper Stockton channel 0.2 mile E of the turning basin.

Weather, Stockton

- (423) Stockton, the county seat of San Joaquin County, is near the center of the great **Central Valley** of California, on the SE corner of the broad delta formed by the confluence of the San Joaquin and Sacramento Rivers. The surrounding terrain is flat, irrigated farm- and orchard-land, near sea level, with the rivers and canals of the delta controlled by a system of levees.

- (424) About 25 miles (46 km) E and NE of Stockton lie the foothills of the Sierra Nevada, rising gradually to an elevation of about 1,000 feet (305 m). Beyond the foothills, the mountains rise abruptly to the crest of the Sierra, at a distance of about 75 miles (139 km), with some peaks here exceeding 9,000 feet (2745 m) in elevation. On a few days during the year, when atmospheric conditions are favorable, the “downslope” effect of a N or NE wind can bring unseasonably dry weather to the delta area; but on the whole the Sierra Nevada has little or no effect on the weather of San Joaquin County. The Sierra Nevada does affect the area, however, to the extent that the entire economy of the Central Valley depends upon the underground water supplies and rivers which are fed in summer by the melting snows which have piled up during the winter on the windward (W) slopes of the mountains.

- (425) To the W and SW, the Coast Range, with peaks above 2,000 feet (610 m), form a barrier separating the Central Valley from the marine air, which dominates the climate of the coastal communities. Several gaps in the Coast Range in the San Francisco Bay Area, however, permit the passage inland of a sea breeze which fans out into the delta and has a moderating effect on summer heat, with the result that Stockton enjoys slightly cooler summer days than communities in the upper San Joaquin and Sacramento Valleys.

- (426) Stockton’s climate is characterized in summer by warm, dry days and relatively cool nights, with clear skies and no rainfall; and in winter by mild temperatures and relatively light rains, with frequent heavy fogs. The annual average temperature is 62°F (16.7°C) with an average daily maximum of 74°F (23.3°C) and an average daily minimum of 49°F (9.4°C).

- (427) The annual rainfall averages between 13 and 14 inches (330 to 356 mm), with 90 percent of this precipitation falling in the winter-half year, i.e., November through April. Thunderstorms are infrequent, occurring on 3 or 4 days a year, generally in the spring, and occasionally in summer, although rainfall with summer thunderstorms is negligible. Measurable rain can be expected on about 52 days a year, and rain exceeding 0.5 inch (13 mm) on about 7 days a year. Since the Pacific storms that bring rainfall to this area are associated with above-freezing temperatures (>0°C) at sea-level elevations, snowfall is practically unknown in the Stockton area with trace amounts happening a few times and measurable snowfall happening only one time; February 1976.

- (428) In summer, temperatures exceeding 100°F (37.8°C) can be expected on 6 days in July and about 14 days during the entire summer. During these hot afternoons the air is extremely dry, with relative humidities running generally less than 20 percent. Even on these hot days, however, temperatures will fall into the low sixties (16.1° to 17.2°C) at night. In winter the nighttime temperature on clear nights will fall to, or slightly below, freezing (0°C), and will rise in the afternoon into the low fifties (10.6° to 11.7°C). The all-time recorded maximum for Stockton is 114°F (45.5°C) recorded in July 1972 while the all-time minimum is 16°F (-8.9°C) recorded in January 1949. Each month, April through October, has recorded temperatures in excess of 100°F (37.8°C) while each month, November through April, has recorded temperatures of freezing (0°C) or lower.

- (429) In late autumn and early winter, clear still nights give rise to the formation of dense fogs, which normally settle in during the night and burn off sometime during the day. In December and January, the so-called fog season, under stagnant atmospheric conditions the fog may last for as long as 4 or 5 weeks, with only brief and temporary periods of clearing.

Pilotage, San Joaquin River

- (430) River pilots, commissioned by the Port of Stockton, are obtained by ship’s agents, through the office of the Port of Stockton, or the San Francisco Bar Pilots.

Towage

- (431) It has not been necessary for towage companies to operate at this port because all vessels operate under their own power; however, tugs up to 1,200 hp are available.

Quarantine, customs, immigration, and agricultural quarantine

- (432) (See chapter 3, Vessel Arrival Inspections, and Appendix A for addresses.)

- (433) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Facilities in the Port of Stockton							
Name	Location	Berthing Space (feet)	Depths* (feet)	Deck Height (feet)	Mechanical Handling Facilities and Storage	Purpose	Owned/ Operated by:
1 Port of Stockton Wharves 12 and 13	37°57'02"N., 121°20'05"W.	843	40	13.4	<ul style="list-style-type: none"> • 130,000-ton Open storage area • Tank storage (19.2 million gallons) • Loading tower and belt conveyor system 	<ul style="list-style-type: none"> • Shipment of miscellaneous dry bulk commodities (clay, sulphur, and petroleum coke) • Receipt and shipment of liquid fertilizer 	Port of Stockton/ Metropolitan Stevedoring Co., Hydro Agri North America, Inc., Rice Terminals, Bay Sulfur Co.
2 Port of Stockton Wharves 10 and 11	37°57'05"N., 121°19'55"W.	1,011	35	15.5	<ul style="list-style-type: none"> • Open storage (18.5 acres) • Two 30-ton container cranes • Three 30-ton bridge cranes • One 150-ton crawler crane 	<ul style="list-style-type: none"> • Receipt and shipment of conventional and containerized general cargo • Receipt and shipment of steel products and liquid fertilizer 	Port of Stockton/ The Learner Co., Hydro Agri North America, Inc., Rice Terminals
3 Port of Stockton Wharf 9	37°57'06"N., 122°19'46"W.	645	35	15.5	<ul style="list-style-type: none"> • Covered storage (56,800 square feet) • Open storage (175 acres) 	Receipt and shipment of conventional general cargo and miscellaneous dry bulk commodities	Port of Stockton
4 Port of Stockton Wharf 8	37°57'00"N., 121°19'30"W.	484	35	15.5	<ul style="list-style-type: none"> • Tank storage: (8 million gal. molasses) (14 million gal. ammonia) • Open storage (30,000 square feet) • Covered storage (36,150 square feet) 	<ul style="list-style-type: none"> • Receipt and shipment of conventional general cargo • Receipt of molasses and anhydrous ammonia 	Port of Stockton/ Brusco Tug & Barge, Inc., California Ammonia Co., Cargill Inc., PM Ag Products Inc.
5 Port of Stockton Wharf 7	37°57'07"N., 121°19'35"W.	516	35	15.5	Covered storage (25,100 square feet)	Receipt and shipment of conventional general cargo	Port of Stockton
6 Port of Stockton Wharf 6	37°57'06"N., 121°19'34"W.	418	35	15.5	Covered storage (17,650 square feet)	Receipt and shipment of conventional general cargo	Port of Stockton
7 Port of Stockton Wharf 5	37°57'06"N., 121°19'30"W.	429	35	15.5	Covered storage (41,000 square feet)	Receipt and shipment of conventional general cargo	Port of Stockton
8 Port of Stockton Wharf 4	37°57'07"N., 121°19'22"W.	461	35	15.5	<ul style="list-style-type: none"> • Covered storage (41,300 square feet) • Open storage (62,800 square feet) 	<ul style="list-style-type: none"> • Receipt and shipment of conventional general cargo • Receipt of dry bulk fertilizer 	Port of Stockton
9 Port of Stockton Wharf 3	37°57'07"N., 121°19'16"W.	461	35	15.5	<ul style="list-style-type: none"> • Covered storage (30,000 square feet) • One 30-ton container crane • Belt-conveyor system 	<ul style="list-style-type: none"> • Receipt and shipment of miscellaneous dry bulk material • Receipt of dry bulk fertilizer and cement 	Port of Stockton/ Viridian Fertilizer Inc., Calaveras Cement Co.
10 Port of Stockton Wharf 2	37°57'05"N., 121°19'12"W.	585	35	15.5	<ul style="list-style-type: none"> • Covered storage (75,000 tons) • Open storage (175 acres) • Two 30-ton gantry cranes 	<ul style="list-style-type: none"> • Receipt and shipment of miscellaneous dry bulk material • Receipt of dry bulk fertilizer and cement 	Port of Stockton/ Viridian Fertilizer Inc., Calaveras Cement Co.
11 Continental Grain Corp. Stockton Elevator Wharf	37°57'04"N., 121°18'59"W.	564	37	15.5	<ul style="list-style-type: none"> • Covered storage (6.8 million bushels) • Two grain towers with loading spouts (1,000 tons per hour) 	Shipment and occasional receipt of grain	Continental Grain Corporation

* The depths given above are reported. For information on the latest depths contact the port authorities or the private operators.

Wharves

(434) Deep-draft facilities at the Port of Stockton are on the S side of Stockton Deep Water Channel from the junction with the San Joaquin River E to the turning basin (East Complex). All facilities have highway connections and the facilities operated by the Port of Stockton are served by the port's beltline railroad, which connects with two major railroads. All facilities have water connections and most have electrical. Warehouse storage is available in the port for general merchandise and dry bulk materials. General cargo is usually handled by ship's tackle or by shore side traveling cranes; special handling equipment, if available, is listed under 'Mechanical Handling Facilities' in the table. Shore-based

hoisting facilities with lifting capacities to 150 tons are available. Additional rental cranes are available locally. Floating cranes for heavy lifts are available at Alameda. Depths alongside are reported; for information on the latest depths contact the Stockton Port District. Only the deep-draft facilities are listed in the table. For a complete description of the port facilities refer to Port Series No. 32, published and sold by the U.S. Army Corps of Engineers. (See Appendix A for address.)

Supplies

(435) Supplies may be had in any quantity, and water is piped to the wharves. Ships may fuel from barges;

alongside bunkering of large vessels may be done at the oil terminals in San Pablo Bay and Carquinez Strait.

Repairs

- (436) Some dockside facilities are available here, but major repairs to oceangoing vessels must be done at the drydocks in San Francisco, Oakland, Alameda, and Richmond. Several facilities make repairs to small craft; marine railways up to 200-ton capacity are available.

Small-craft facilities

- (437) Several small-craft facilities are at Stockton or nearby.

San Joaquin River above Stockton

- (438) From its junction with Stockton Channel, the river has a controlling depth of about 3 feet for 70 miles to Hills Ferry, and is used only by small pleasure craft, fishermen, and an occasional small barge. The only facilities available are those dispensing gasoline, lubricants, and water at a few points.

Bridges

- (439) More than 15 bridges cross San Joaquin River between Stockton and Hills Ferry. The minimum clearance for bridges crossing the river between Stockton and Mossdale, about 13 miles above Stockton, is 17 feet. (See **117.1 through 117.59 and 117.191**, chapter 2, for drawbridge regulations.)

Charts 18661, 18662

- (440) The principal tributaries of the San Joaquin River are described as the river is ascended. Bridge clearances are at low water. (See **117.1 through 117.59, 117.143, 117.150, 117.157, 117.159, 117.161, 117.167, 117.171, 117.175, and 117.183**, chapter 2, for drawbridge regulations.)

- (441) **Threemile Slough**, meets the San Joaquin River 5.8 miles above Antioch Bridge and joins the Sacramento River at the N end of Decker Island. The slough is a route frequently used by tugs and barges making passage between Sacramento and Stockton. Near the junction with the Sacramento River is a highway lift bridge with clearances of 16 feet down and 110 feet up at low water. The bridgetender monitors VHF-FM channel 16 and works on channel 9; call sign KMJ-385, Threemile Slough Bridge. (See **117.1 through 117.49**, chapter 2, for drawbridge regulations.) The power cable E of the bridge has a clearance of 108 feet.

Anchorage

- (442) A **restricted anchorage area** is along the E side of **Decker Island**. (See **162.205**, chapter 2, for limits and regulations.)

- (443) **Mokelumne River**, one of the principal tributaries of the San Joaquin River, rises in the Sierra Nevada and empties into it 11.8 miles above Antioch Bridge. The river separates, 3.5 miles above its mouth, into two branches, the **North Mokelumne River (North Fork)** and the **South Mokelumne River (South Fork)**. The branches continue in a N direction and rejoin 9 miles NNE from the mouth. The river then describes a semi-circular route for 7 miles to the N and E to the head of navigation at the Galt-New Hope Bridge.

- (444) Corps of Engineers project maps for 1978 show the following controlling depths for Mokelumne River: 12 feet from the mouth to the lower junction of the North and South Mokelumne Rivers, thence 7 feet by North Mokelumne River to Snodgrass Slough; thence 2 feet to upper junction of the North and South Mokelumne Rivers; 7 feet from the lower junction by South Mokelumne River to the upper junction; and thence 2 feet to the Galt-New Hope bridge. Mokelumne River is subject to shoaling; local knowledge is advised.

- (445) **Little Potato Slough** (38°06'00"N., 121°29'30"W.) enters the South Fork of the Mokelumne River about 6 miles E of the confluence of the north and south forks and connects the river with other tributaries of the San Joaquin River.

- (446) **Georgiana Slough** enters Mokelumne River about 3 miles above the mouth, and connects that river with the Sacramento River at Walnut Grove. The controlling depth through the slough is about 13 feet. Tugs and barges formerly used the slough in making the run from Sacramento to Stockton, but to avoid the snags and sharp turns they now favor the route through Threemile Slough.

- (447) **Old River** flows into the San Joaquin River about 13 miles above the Antioch Bridge after diverging from the latter river about 38 miles above the bridge. It is the most W branch of the interconnecting tidal channels into which San Joaquin River divides in crossing its delta. Old River has many sloughs and canals that connect with Middle River to the E.

- (448) In 1978, the controlling depths in Old River were: 10 feet for 10 miles from the mouth to Orwood; thence 10 feet for 9 miles to the lower end of Grant Line Canal; thence 7 feet for 9 miles to the Holly Sugar Factory near Tracy; and from the other end of Grant Line Canal to the head of Old River in San Joaquin River, 5 feet.

- (449) The Holly Sugar Co. refinery and terminal near Tracy has a large wharf and an unloading basin; a passing basin is about 0.5 mile downstream from the terminal.

- (450) **Middle River** enters the San Joaquin River 15.3 miles above Antioch Bridge. The river and connecting channels are a part of a complicated network of tidal canals, some natural and some artificial, in the delta of the San Joaquin River. One of the principal channels, Middle River leaves Old River at the SW corner of Roberts Island about 7 miles SSW of Stockton and roughly parallels Old River to the San Joaquin River.

Structures Across the Sacramento Deep Water Ship Channel, Sacramento River and its Principal Tributaries

Name•Description•Type	Location	Clear Width of Draw or Span Opening (feet)	Clear Height above Water Datum (feet)		Information
			Low	High	
Sacramento River					
1	Overhead power cable	38°03'55"N., 121°47'09"W.		125	
2	Overhead power cable	38°04'56"N., 121°45'10"W.		140	
3	Overhead power cable	38°05'07"N., 121°44'45"W.		130	Clearance of 160 feet over ship channel
4	Rio Vista/State Highway 12 Vertical Lift Bridge (highway)	38°09'31"N., 121°40'57"W.	270	22 (down) 149 (up)	18 (down) 144 (up) Bridgetender monitors VHF-FM channel 16 and works on channels 9 and 13; call sign KMJ-384, Rio Vista Bridge. (Note 1)
5	Overhead power cable	38°10'04"N., 121°37'43"W.		125	
6	Overhead power cable	38°09'52"N., 121°37'16"W.		125	
7	Isleton Bascule Bridge (highway)	38°10'19"N., 121°35'38"W.	200 (166 open)	18	15 Bridgetender monitors VHF-FM channel 16 and works on channel 9; call sign KMJ-383, Isleton Bridge. (Note 2)
8	Walnut Grove Bascule Bridge (highway)	38°14'33"N., 121°30'53"W.	199 (187 open)	24	21 Bridgetender monitors VHF-FM channel 16 and works on channel 9; call sign KMJ-491, Walnut Grove Bridge. (Note 2)
9	Overhead power cable	38°17'34"N., 121°33'45"W.			110
10	Paintersville Bascule Bridge (highway)	38°19'07"N., 121°34'40"W.	198	27	24 Bridgetender monitors VHF-FM channel 16 and works on channel 9; call sign KMJ-381, Paintersville Bridge. (Note 2)
11	Overhead power cable	38°20'45"N., 121°32'56"W.			125
12	Freeport Bascule Bridge (highway)	38°27'21"N., 121°30'07"W.	199 (190 open)	32	29 Bridgetender monitors VHF-FM channel 16 and works on channel 9; call sign KMJ-490, Freeport Bridge. (Note 2)
13	Overhead power cable	38°28'02"N., 121°30'17"W.			125
14	Interstate 80 Fixed Bridges	38°34'18"N., 121°30'57"W.	214	84	81
15	Tower Vertical Lift Bridge (highway)	38°34'50"N., 121°30'30"W.	170	32 (down) 98 (up)	30 (down) 96 (up) Bridgetender monitors VHF-FM channel 16 and works on channel 9; call sign KDO-739, Tower Bridge. (Notes 2 and 7)
16	I Street Swing Bridge (highway & railway)	38°35'11"N., 121°30'23"W.	148	32	30 (Note 2)
17	Overhead power cable	38°35'11"N., 121°30'23"W.			80 (east draw) 74 (west draw) Clearances reference the draws of the I Street Swing Bridge
Junction with American River					
18	Overhead power cable	38°35'50"N., 121°30'32"W.			125
19	Overhead power cable	38°35'33"N., 121°30'28"W.			125
20	Interstate 80 Fixed Bridges	38°35'54"N., 121°32'53"W.	250	85	82
21	Overhead power cable	38°35'58"N., 121°33'00"W.			80
22	Interstate 5 Fixed Bridges	38°40'24"N., 121°37'35"W.	175	84	55
23	Overhead power cable	38°47'00"N., 121°37'06"W.			125
Junction with Feather River					
24	Overhead power cables	38°47'06"N., 121°37'16"W.			80
25	Overhead power cables	38°45'49"N., 121°41'00"W.			80
26	Overhead power cables	38°45'49"N., 121°41'15"W.			125
27	State Highway 113/Knights Landing Bascule Bridge	38°48'08"N., 121°43'12"W.	199 (160 open)	23	(Note 2)
28	Overhead power cables	38°48'13"N., 121°43'23"W.			125
29	Overhead power cable	38°49'09"N., 121°43'27"W.			124
30	Overhead power cable	38°51'34"N., 121°43'52"W.			125
31	Overhead power cable	38°51'35"N., 121°43'52"W.			125
32	Overhead power cable	38°53'58"N., 121°48'12"W.			80
33	Overhead power cable	39°00'51"N., 121°49'32"W.			125
34	Overhead power cable	39°02'27"N., 121°50'02"W.			80
35	Overhead power cable	39°04'00"N., 121°52'13"W.			125
36	Overhead power cable	39°04'25"N., 121°53'26"W.			60
37	Meridian/State Highway 20 Swing Bridge	39°08'44"N., 121°55'04"W.	143	39	10 (Note 2)
38	Overhead power cable	39°08'45"N., 121°55'04"W.			120
39	Overhead power cable	39°10'12"N., 121°56'15"W.			106

Structures Across the Sacramento Deep Water Ship Channel, Sacramento River and its Principal Tributaries (continued)

Name-Description-Type	Location	Clear Width of Draw or Span Opening (feet)	Clear Height above Water Datum (feet)		Information
			Low	High	
38 River Road Bridge (removable span)	39°12'51"N., 122°00'02"W.	100	32		Vertical clearance is 6 feet (25 feet when raised) above flood level. (Note 2)
39 Overhead telephone cable	39°12'52"N., 121°00'04"W.			75	
40 Overhead power cable	39°12'53"N., 121°00'07"W.			75	
Sacramento Deep Water Ship Channel at Cache Slough					
41 Overhead power cable	38°11'16"N., 121°39'36"W.			137	
42 Overhead power cable	38°15'58"N., 121°39'52"W.			140	
43 Overhead power cable	38°19'17"N., 121°39'02"W.			140	
44 Overhead power cable	38°28'26"N., 121°35'01"W.			140	
45 Overhead power cable	38°33'08"N., 121°34'43"W.			140	
46 Overhead power cable	38°33'40"N., 121°33'33"W.			140	
47 Industrial Boulevard Fixed Bridge	38°33'41"N., 121°32'20"W.	130	32	29	
48 Jefferson Boulevard Bascule Bridge (highway/railway)	38°33'41"N., 121°31'43"W.	86 (73 open)	20	17	
Steamboat Slough					
49 Overhead power cable	38°13'49"N., 121°36'09"W.			125	
50 Steamboat Slough Bascule Bridge	38°18'17"N., 121°34'28"W.	200 (184 open)	24	21	Bridgetender monitors VHF-FM channel 16 and works on channel 9; call sign WHX-295, Steamboat Slough Bridge. (Note 3)
Lindsey Slough					
51 Hastings Farm Highway Bridge (removable span)	38°14'49"N., 121°52'09"W.	53	22	19	(Note 4)
52 Overhead power cable	38°14'51"N., 121°42'24"W.			110	
53 Overhead power cable	38°15'30"N., 121°43'37"W.			85	
Miner Slough					
54 Overhead power cable	38°15'56"N., 121°38'37"W.			114	
55 State Route 84 Swing Bridge	38°17'32"N., 121°37'51"W.	72	21	17	(Note 5)
56 Overhead power cable	38°17'12"N., 121°36'27"W.			110	
Sutter Slough					
57 Overhead power cable	38°16'00"N., 121°36'08"W.			93	
58 Overhead power cable	38°19'44"N., 121°34'42"W.			93	
59 State Route 160 Swing Bridge	38°19'40"N., 121°34'35"W.	75	22	19	(Note 6)

Note 1 – See 117.1 through 117.59, chapter 2 for limits and regulations
Note 2 – See 117.1 through 117.59 and 117.189, chapter 2 for limits and regulations
Note 3 – See 117.1 through 117.59 and 117.199, chapter 2 for limits and regulations
Note 4 – See 117.1 through 117.59 and 117.165, chapter 2 for limits and regulations
Note 5 – See 117.1 through 117.59 and 117.173, chapter 2 for limits and regulations
Note 6 – See 117.1 through 117.59 and 117.201, chapter 2 for limits and regulations
Note 7 – The decorative lighting on the bridge will be extinguished upon request of the mariner.

(451) The controlling depth in Middle River is about 6 feet to the Bacon Island swing bridge, about 15.5 miles below the junction with Old River. The channel is not maintained above the bridge, and navigation is obstructed by many snags and shoals.

Cable ferry

(452) Woodward Island Ferry crosses Middle River about 12.5 miles below the junction with Old River. The ferry carries passengers and vehicles, and operates from 0800 to 1700 daily. White warning signs, with black letters and orange borders, are posted about 500 feet on either side of the ferry crossing. Flashing red beacons

are shown by the ferry when underway. When the ferry is underway, the cables are 6 to 7 feet above the water surface; when docked, the cables are on or within 1 or 2 feet of the bottom. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

(453) **Empire Cut** enters Middle River about 16.5 miles below the latter's junction with Old River.

Cable ferries

(454) Mildred Island Ferry crosses Empire Cut about 0.6 mile E of the junction with Middle River. This private cable ferry carries passengers, vehicles and farm

equipment, and operates during daylight hours. When the ferry is underway, the cables are suspended at an unknown depth below the water surface; when docked, the cables are dropped to the bottom. A sign on each side of the ferry warns of the cables; a flashing red signal is shown when underway. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

(455) Gasoline and fishing supplies may be obtained at the town of **Middle River**, about 8.5 miles above the mouth.

(456) **Little Connection Slough** enters the San Joaquin River about 1 mile above the mouth of Middle River.

Cable ferry

(457) Venice Island Ferry crosses Little Connection Slough about 1 mile above the entrance. The ferry carries passengers and vehicles and operates from 0800 to 1700 daily. White warning signs, with black letters and orange borders, are posted about 500 feet on either side of the ferry crossing. Flashing red beacons are shown by the ferry when underway. When the ferry is underway, the cables are 6 to 7 feet above the water surface; when docked, the cables are dropped to the bottom. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

(458) **Turner Cut** enters the San Joaquin River about 7.5 miles below Stockton and is crossed about 2 miles above the entrance by a highway bridge with a 30-foot retractable span. The bridge is normally maintained in the open position except when it is being crossed by a vehicle.

(459) **Sacramento River** rises in the Trinity Mountains in N central California, flows S for 325 miles, and enters Suisun Bay on the N side of **Sherman Island**. Deep-draft vessels follow the lower Sacramento River to **Cache Slough**, 1.5 miles above Rio Vista Bridge, thence through a deepwater ship channel to Sacramento, a distance of 37 miles above the mouth of the river. Barges and other small craft also use Sacramento River all the way to Sacramento, a distance of 50 miles. Above Sacramento, small craft go to Colusa, 125 miles above the mouth, but there is no regular navigation above this point.

Cable ferry

(460) **Steamboat Slough** enters Cache Slough about 1.8 miles above Rio Vista bridge. A cable ferry crosses the Steamboat Slough about 5 miles above the junction with Cache Slough. The ferry carries passengers and vehicles, and operates 24 hours daily. When the ferry is underway, the cable is suspended below the water surface at varying depths. When the ferry is docked, the cable is about 5 feet below the surface of the water. Warning signs are posted at the crossing. When underway, the ferry shows flashing red lights. **DO NOT ATTEMPT TO PASS A MOVING CABLE FERRY.**

Channels

(461) **Sacramento River Deep Water Ship Channel** extends from Suisun Bay through lower Sacramento River, Cache Slough, and a 22-mile land cut to a triangular harbor and turning basin at the Port of Sacramento. The **William G. Stone Lock** is on the barge canal that once connected the Deep Water Ship Channel with the Sacramento River; the lock is closed to all navigation.

(462) The project depth in the ship channel is generally maintained. (See Notice to Mariners and latest editions of charts for controlling depths.) The controlling depth in the river route is about 10 feet. Above Sacramento, the controlling depth is about 6 feet to Colusa. The sounding datum is **mean lower low water at low-river stage**.

(463) Numerous uncharted piles, snags, pumps, and pipes, some submerged, may exist along the edges of the river. Mariners are advised to exercise extreme caution while navigating close to the banks of the river.

Currents

(464) Currents in Sacramento River depend on the river stage. During high-river stages, there is little or no flood current and the ebb current is strong to Sacramento. During the dry season a flood current can be carried to Paintersville and from there slack water to Freeport, 30 and 41 miles above the mouth, respectively. At times of extreme low-river stages, flood current may be evident as far as Sacramento. Local knowledge is required to estimate current conditions for a particular time.

(465) Major floods in the Sacramento River valley usually occur from November to April and are generally caused by intense general storms of several days' duration, the runoff from which may be augmented by the melting of snow in the mountains. At the mouth of the river an ordinary flood will cause a rise of 8 feet and an extreme flood a rise of 10 feet in the river level. At Sacramento, ordinary flood will cause a rise in the river level of 20 feet and extreme flood, a rise of 30 feet.

(466) Reports of gage heights of the Sacramento River can be obtained from the Sacramento National Weather Service Office at any time of the year. The information is published in the **Sacramento Bee** and, in addition, is reported on the radio broadcast from station KFBK (1530 kHz) whenever the gage heights are of sufficient magnitude to be of general interest. Information on gage heights can also be obtained from the State Department of Water Resources, 901 "P" Street, Sacramento, CA 95814 or by recorded message at 916-651-0725.

(467) The upper 20 miles of Sacramento River Deep Water Ship Channel are free of river current and flood waters. However, the area is still affected by tidal currents.

Weather, Sacramento Valley

(468) The climate of the lower Sacramento Valley is mild, with plenty of sunshine year round. Cloudless skies prevail during the spring, summer, and fall. Winter is the rainy season, with measurable amounts falling on about

10 days per month. Snow is rare, since freezing temperatures are rare. The valley is protected from most severe winter storms by the mountains to the W, N, and E. Sometimes, torrential rains on the slopes can cause flooding along the Sacramento River. The average annual precipitation for the Sacramento Airport is about 17.5 inches (445 mm) with about 90% of this amount falling from November through April.

(469) The mountains are responsible for the predominantly S winds throughout the valley. These are oceanic winds that have moved through the Carquinez Strait and been turned N by the Sierra ranges. At the port of Sacramento, SE through SW winds prevail, particularly during spring and summer. NW through N winds are also frequent, and bring warm, dry air down the mountains. These winds cause brief heat waves, with temperatures rising to over 100°F (37.8°C) in summer, and they modify cool weather in winter. Strongest winds occur in winter although gales occur less than 1 percent of the time, even in midwinter. Winds of 17 to 28 knots occur 6 to 10 percent of the time from December through March, and less than 5 percent of the time during July, August, and September. Extreme winds have reached 60 knots, with gusts of more than 70 knots; these are most likely during fall or winter.

(470) Dense fog is common in winter, infrequent during spring and fall, and rare in summer. It is a radiation type fog that occurs during the late night and early morning hours. It usually clears by noon. Occasionally stagnant weather conditions will cause the fog to hang on for a few days. Visibilities at Sacramento drop below 0.5 mile (0.9 km) on about 5 to 10 nights per month, from November through February. During this same period, they fall below 7 miles (13 km) on about 10 to 20 occasions per month. During the summer, visibilities are almost always better than 7 miles (13 km). Twenty-two out of 31 days during each month, December and January, can expect fog. This number drops to less than one day for both June and July.

Routes

(471) The deep-draft channel to the Port of Sacramento through Sacramento River Deep Water Ship Channel is marked with navigational aids.

(472) The shallow-draft route continues in Sacramento River from 1.5 miles above the Rio Vista Lift Bridge to Sacramento, and for the most part is marked by leading lights.

(473) From Ida Island for a distance of 3.5 miles upstream there are shifting shoals. After passing Ida Island work gradually over to the W half of the channel and favor that side around the next bend. From this point to Clarksburg the channel is clear, and midchannel courses may be followed favoring the falling tide bends. At Clarksburg favor the E shore a little until just past the town, then swing into midchannel again. From just below Freeport the channel is rather shoal and wing dams have been built at several places to scour out the

channel. These are covered at high-water stages and may be struck if the shore is approached too closely. By favoring the ebbtide bends no trouble should be encountered from here to Sacramento.

(474) **NOTE:** Care should be exercised at all times to keep clear of the levees, as most of them are faced with rock which may damage vessels that drag along them.

Pilotage, Sacramento River

(475) River pilots, commissioned by the Port of Sacramento, are arranged for by the ship's agents, but may be obtained through the office of the port of Sacramento or the San Francisco Bar Pilots

Towage

(476) Tugs up to 1,500 hp are available.

Chart 18661

(477) **Rio Vista**, on the NW bank, 10.5 miles above the mouth of the Sacramento River, is commercially the most important town below Sacramento. The **Rio Vista Coast Guard Station** is just S of the town. A small-craft harbor on the S side of the town has gasoline, diesel fuel, water, and berths available. A 20 ton lift here can handle craft up to 40 feet for hull and engine repairs. A large dredging facility is on the NW side of the river just N of the Rio Vista Bridge.

(478) **Ida Island**, on the S bank 13.5 miles above the mouth of the river, is the site of a resort and small-boat basin. Gasoline, water, and moorage are available. A full marine service with marine railway can handle vessels up to 40 feet.

(479) **Isleton**, on the S bank 15 miles above the mouth of the river, has a 140-foot public landing. Gasoline, diesel fuel, and some supplies are available in town. A large grain elevator is on the SE side of the river, 0.75 mile above Isleton.

Chart 18662

(480) **Walnut Grove**, 24 miles above the mouth of Sacramento River, is at the junction with Georgiana Slough. Gasoline, and marine supplies may be obtained in moderate quantities. A wharf and a large wooden shed are on the E side of the river 1.2 miles above Walnut Grove; gasoline and some repair work is available. A **measured nautical mile** along the NE side of the river begins 1.2 miles above Walnut Grove. A resort is at the junction of Steamboat Slough with the river. Gasoline and water are available. Five miles above Walnut Grove at the small village of **Paintersville**, a highway bridge with a double-bascule span across the river has a clearance of 24 feet. (See **117.1 through 117.59 and 117.189**, chapter 2, for drawbridge regulations.) The bridgetender monitors VHF-FM channel 16 and works on channel 9; call sign: KMJ-381, Paintersville Bridge.

(481) **Courtland**, 31 miles above the mouth of the river, has supplies in moderate quantities; gasoline, oil, water, and ice are available.

(482) At **Clarksburg**, 37.5 miles above the mouth of the river, there are two abandoned oil company landings.

(483) **Freeport**, 41.5 miles above the mouth of the river, has gasoline. A water intake facility at 38°28'21"N., 121°30'24"W. is marked by four private white lights.

(484) A paved highway between Antioch and Sacramento runs along the levee of the river for nearly its entire distance.

(485) **Sacramento** the State capital, is the head of navigation for most of the shipping on the river, and is a distribution and transportation center for N California and parts of Nevada and Oregon. The **Port of Sacramento**, 79 miles above the Golden Gate Bridge and at the head of the deepwater channel, is an important point for interchange of cargo between rail, highway, and water transportation. The port has a 124 metric ton capacity mobile harbor crane that will handle container cargo.

Weather, Sacramento

(486) The lower Sacramento Valley, where Sacramento is located, enjoys a mild climate and abundance of sunshine throughout the year. Cloudless skies prevail during the summer and largely in the spring and autumn. The summers are remarkably dry, with warm days and pleasant nights. In the winter “rainy season” (December, January, and February) over one-half of the total annual precipitation falls, yet rain in measurable amounts occurs only on about 10 days monthly during winter. Snow is rare since freezing temperatures are rare, with trace amounts falling several times and measurable snowfall having fallen on only one occasion, two inches (51 mm) in February 1976. Mountains surround the valley to the W, N, and E. The Sierra Nevada snow fields are only 70 miles E of Sacramento and usually provide a plentiful supply of water in the valley streams during the dry season. Because of the shielding influence of the high mountains around the valley, winter storms reach valley districts in modified form. However, torrential rain and heavy snow frequently fall on the western Sierra slopes, the southern Cascades, and to a lesser extent the Coastal Range. As a result, flood conditions occasionally occur along the Sacramento River and its tributaries. Excessive rainfall and damaging windstorms are rare in the valley. The average annual precipitation for the Sacramento Airport is about 17.5 inches (445 mm) with about 90% of this amount falling from November through April.

(487) Prevailing winds at Sacramento are S all year, due to the N-S direction of the valley and the deflecting effect of the towering Sierra Ranges on the prevailing oceanic winds that move through the Carquinez Strait at the junction of the Sacramento and San Joaquin Rivers. No other tidewater gap exists in the coastal mountains to admit marine air into the Sacramento or the San Joaquin Valley. Occasionally a steep northerly barometric

pressure gradient develops and air is forced over the Siskiyou Mountains to the N, warmed dynamically with descent, and reaches the valley floor as a warm, dry, N wind. These occasionally disagreeable winds, known as “northers” in the valley, are the counterpart of the well-known “chinook” winds of the Rocky Mountains, and they, or modifications of them, produce the pronounced heat waves in summer. Fortunately, they are of infrequent occurrence and produce an unstable atmospheric condition that is usually followed within 2 or 3 days by the normally cool S breezes, especially at night. Summer nights in the lower Sacramento Valley are, with few exceptions, cool and invigorating, the result of a prevailing oceanic influence. While it is true that “northers” cause dry, hot weather for brief periods during the summer, it is equally true they are the modifications of cold waves in the winter. Winter northers, with only a few exceptions, are comparatively warm, drying winds. The average annual temperature for Sacramento is 61°F (16.1°C) with an average maximum of 74°F (23.3°C) and an average minimum of 48°F (8.9°C). The all-time maximum occurred in June 1961 when the mercury climbed to 115°F (46.1°C). The all-time minimum of 18°F (-7.8°C) was recorded in December 1990. Each month, May through October, has seen temperatures in excess of 100°F (37.8°C) while every month, November through April, has recorded temperatures at or below freezing (0°C).

(488) The average annual thunderstorm occurrence is three. They are usually mild and are most likely in February and March. However, they have been documented in each of the twelve months. Snow falls so rarely, and in such small amounts, that its occurrence may be disregarded as a climatic feature. Heavy fog occurs mostly in midwinter, rarely in summer, and seldom in spring or autumn. Light and moderate fog are more frequent and may come anytime during the wet, cold season. The fog is usually the radiational cooling type, and confined to the early morning hours. An occasional winter fog, under stagnant atmospheric conditions, may continue for several days.

(489) (See Appendix B for **Sacramento climatological table**.)

Pilotage, Sacramento

(490) See Pilotage, Sacramento River, indexed as such, earlier in this chapter.

Towage

(491) Tugs up to 1,500 hp are available.

Quarantine, customs, immigration, and agricultural quarantine

(492) (See chapter 3, Vessel Arrival Inspections, and Appendix A for addresses.)

(493) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.)

Facilities in the Port of Sacramento

	Name	Location	Berthing Space (feet)	Depths* (feet)	Deck Height (feet)	Mechanical Handling Facilities and Storage	Purpose	Owned/ Operated by:
1	Port of Sacramento Berth 8	38°33'56"N., 121°33'04"W.	840	35	19	• Covered storage (308,000 square feet) • Open storage (27.3 acres)	Shipment of miscellaneous dry bulk commodities	Port of Sacramento
2	Port of Sacramento Berth 7	38°33'53"N., 121°32'58"W.	840	35	19	Covered storage (86,400 square feet)	Receipt and shipment of general cargo	Port of Sacramento
3	Port of Sacramento Berth 6	38°33'50"N., 121°32'54"W.	600	35	19	Open storage (6 acres)	Receipt and shipment of general cargo and miscellaneous dry bulk	Port of Sacramento
4	Port of Sacramento Berth 5	38°33'46"N., 121°32'48"W.	600	35	19	• Silo storage (1.2 million bushels) • Vessel loading spouts	Shipment of grain, feed pellets, miscellaneous dry and liquid bulk	Port of Sacramento/ Cargill, Inc.
5	Port of Sacramento Berth 2	38°33'42"N., 121°32'38"W.	600	35	19	Covered storage (86,400 square feet)	Receipt and shipment of general cargo	Port of Sacramento
6	Port of Sacramento Berth 1	38°33'42"N., 121°32'31"W.	613	35	19	• Silo storage (21,500 tons) • Vessel loading spouts	Receipt and shipment of bulk rice	Port of Sacramento

* The depths given above are reported. For information on the latest depths contact the port authorities or the private operators.

Coast Guard

(494) **Sacramento Coast Guard Air Station** is NE of Sacramento at McClellan Air Force Base.

Harbor regulations

(495) Copies of the harbor regulations are available from the Port of Sacramento located at 1110 West Capital Avenue, West Sacramento, CA 95691.

(496) The port radio station KPB-386 VHF-FM channel 18A is monitored 24 hours a day.

Wharves

(497) The deepwater facilities of the Port of Sacramento consist of six berths, each of which has a berthing length of at least 600 feet with a deck height of 19 feet and reported depths alongside of 35 feet. All berths are served by railroad and highway connections, and all berths have water and electrical shore power connections. General cargo at the port is usually handled by ship's tackle; mechanical handling equipment, if available, is mentioned in the facilities table. All of these facilities are owned and most are operated by the Sacramento-Yolo Port District. For a complete description of the port facilities refer to Port Series No. 32 published and sold by the U.S. Army Corps of Engineers. (See Appendix A for address.) or visit the website <http://www.portofsacramento.com> for additional information.

Supplies

(498) Provisions are available in any quantity. Some marine supplies may be obtained. Fuel oil may be obtained by tank truck or barge. Ships do not normally take on fuel or provisions in Sacramento.

Repairs

(499) There are no repair facilities for large oceangoing vessels in Sacramento; the nearest shipyards with large

drydocks are at Richmond, Oakland, Alameda, and San Francisco.

Small-craft facilities

(500) There are several small-craft facilities along the Sacramento River at Sacramento. (See the small-craft facilities tabulation on chart 18662 for services and supplies available.) Mariners are advised that there are no facilities serving small craft along the Sacramento Deep Water Ship Channel and at the Port of Sacramento. Once at the head of navigation on the channel, there is no way to pass through the locks to the Sacramento River.

Communications

(501) Sacramento is served by four railroads, several highways, and two airports.

Chart 18664, 18667

(502) Above Sacramento the prevailing flood conditions are as follows: At Verona at the junction of Feather River, 70 miles above the mouth, 20 feet at ordinary floods and 24 feet at extreme floods; at Colusa, 125 miles above the mouth, 25 feet at ordinary floods and 32 feet at extreme floods.

(503) Between Sacramento and Colusa are numerous warehouses and small landings.

(504) **Feather River** rises in the Sierra Nevada and empties into Sacramento River at **Verona**, 18 miles above Sacramento. The river has been improved by snagging and the construction of wing dams at **Marysville**, 26 miles above the mouth. The controlling depth is usually 3 feet from about February 15 to June 15. Ordinary flood fluctuation is 20 feet, and extreme flood fluctuation is about 25 feet. With the exception of several small privately owned landings, all loading is handled on the

banks. There has been no commercial navigation on the Feather River in recent years.

Chart 18665

⁽⁵⁰⁵⁾ **Lake Tahoe** (39°06'N., 120°00'W.), California-Nevada, is a recreation area almost surrounded by Tahoe, Toiyabe, and Eldorado National Forests. **Restricted areas** established by Federal regulations are given in **162.210 and 162.215**, chapter 2. Lake Tahoe is to be

navigated by leaving all red buoys to starboard when transiting in a counterclockwise direction. Safe water will always be found toward the center of the lake from red federal buoys. Information about facilities may be obtained from one of the local offices of the Forest Service, U.S. Department of Agriculture.

Coast Guard

⁽⁵⁰⁶⁾ **Lake Tahoe Coast Guard Station** is on the W shore of the lake about 1.2 miles NE of Tahoe City.

TIDAL INFORMATION					
Chart	Station	LAT/LONG	Mean Higher High Water*	Mean High Water*	Mean Low Water*
18645	Princeton, Half Moon Bay	37°30'N/122°29'W	5.5	4.9	1.1
18645	Southeast Farallon Island	37°42'N/123°00'W	5.6	4.9	1.1
18647	Point Reyes, Drakes Bay	38°00'N/122°59'W	5.8	5.1	1.2
18649	Oakland Inner Harbor, San Francisco Bay	37°48'N/122°17'W	6.5	5.8	1.1
18649	Point Orient, San Francisco Bay	37°58'N/122°26'W	6.0	5.4	1.1
18649	Hunters Point, San Francisco Bay	37°44'N/122°21'W	6.8	6.2	1.1
18649	Yerba Buena Island, San Francisco Bay	37°49'N/122°22'W	6.2	5.5	1.1
18650	San Leandro Channel, San Francisco Bay	37°42'N/122°12'W	7.2	6.6	1.1
18650	San Francisco (Golden Gate)	37°48'N/122°28'W	5.8	5.2	1.1
18650	Rincon Point, Pier 22 1/2, San Francisco Bay	37°47'N/122°23'W	6.3	5.7	1.1
18650	Alameda (Naval Air Station), San Francisco Bay	37°46'N/122°18'W	6.6	5.8	1.1
18650	Alcatraz Island, San Francisco Bay	37°50'N/122°25'W	5.8	5.2	1.1
18650	Oakland Middle Harbor, Pier 40	37°48'N/122°20'W	6.2	5.6	1.1
18651	San Mateo Bridge (east end)	37°37'N/122°11'W	7.7	7.1	1.2
18651	San Mateo Bridge (west end)	37°35'N/122°15'W	7.7	7.1	1.2
18651	Dumbarton Highway Bridge, San Francisco Bay	37°30'N/122°07'W	8.5	7.9	1.2
18651	Mud Slough Railroad Bridge, San Francisco Bay	37°28'N/121°59'W	7.5	6.9	0.5
18651	Redwood City, Wharf 5, San Francisco Bay	37°30'N/122°13'W	8.2	7.6	1.2
18652	Oyster Point Marina, San Francisco Bay	37°40'N/122°23'W	7.1	6.4	1.1
18652	Petaluma River entrance, San Pablo Bay	38°07'N/122°30'W	6.1	5.6	1.0
18653	Sausalito, San Francisco Bay	37°51'N/122°29'W	5.7	5.1	1.1
18653	Berkeley, San Francisco Bay	37°52'N/122°18'W	5.9	5.3	1.1
18653	Angel Island (west side), San Francisco Bay	37°52'N/122°27'W	5.6	5.0	1.1
18653	Angel Island, East Garrison, San Francisco Bay	37°52'N/122°25'W	5.9	5.3	1.2
18653	Point Chauncey, San Francisco Bay	37°54'N/122°27'W	5.7	5.1	1.1
18653	Richmond Inner Harbor, San Francisco Bay	37°55'N/122°21'W	6.0	5.4	1.1
18653	Point San Quentin, San Francisco Bay	37°57'N/122°29'W	5.8	5.2	1.1
18654	Hercules, Refugio Landing, San Pablo Bay	38°01'N/122°18'W	6.1	5.5	1.0
18654	Mare Island, Carquinez Strait	38°04'N/122°15'W	5.8	5.2	0.9
18654	Sonoma Creek, San Pablo Bay	38°09'N/122°24'W	5.6	5.0	0.8
18655	Selby, Carquinez Strait	38°03'N/122°15'W	6.3	5.8	1.1
18655	Crockett, Carquinez Strait	38°04'N/122°13'W	5.9	5.4	1.0
18655	Mare Island Strait, San Francisco Bay	38°07'N/122°16'W	5.9	5.4	0.9
18656	Suisun City (Suisun Slough)	38°14'N/122°02'W	5.4	4.9	0.7
18656	Suisun Slough entrance	38°07'N/122°04'W	4.7	4.2	0.7
18656	Montezuma Slough Bridge	38°11'N/121°59'W	4.9	4.4	0.7
18657	Benicia, Carquinez Strait	38°03'N/122°08'W	5.3	4.8	0.9
18658	Port Chicago, Suisun Bay	38°03'N/122°02'W	4.9	4.4	0.7
18659	Pittsburg	38°02'N/121°53'W	4.1	3.6	0.6
18659	Antioch, San Joaquin River	38°01'N/121°49'W	3.9	3.4	0.6
18659	Mallard Island Ferry Wharf, Suisun Bay	38°03'N/121°55'W	4.1	3.6	0.6
18659	Collinsville, Sacramento River	38°04'N/121°51'W	4.0	3.5	0.6
18660	Threemile Slough entrance, San Joaquin River	38°05'N/121°41'W	3.6	3.1	0.5
18660	Prisoners Point, San Joaquin River	38°04'N/121°33'W	3.7	3.2	0.5
18660	Wards Island, Little Connection Slough	38°03'N/121°30'W	3.5	3.0	0.5
18660	Irish Landing, San Joaquin River	38°02'N/121°35'W	3.6	3.2	0.5
18660	False River	38°03'N/121°39'W	3.3	2.9	0.5

* Heights in feet referred to datum of sounding MLLW.

Real-time water levels, tide predictions, and tidal current predictions are available at:

<http://tidesandcurrents.noaa.gov>

To determine mean tide range subtract Mean Low Water from Mean High Water.

Data as of September 2012

TIDAL INFORMATION					
Chart	Station	LAT/LONG	Mean Higher High Water*	Mean High Water*	Mean Low Water*
18661	Stockton, San Joaquin River	37°58'N/121°17'W	4.0	3.5	0.5
18661	Georgiana Slough entrance, Mokelumne River	38°07'N/121°35'W	3.3	2.9	0.4
18661	Rio Vista, Sacramento River	38°08'N/121°41'W	4.3	3.8	0.6
18662	Snodgrass Slough, Sacramento River	38°17'N/121°29'W	2.5	2.1	0.3
18662	Clarksburg, Sacramento River	38°25'N/121°31'W	2.9	2.6	0.3
18663	Bishop Cut, Disappointment Slough	38°03'N/121°25'W	3.9	3.4	0.5
18664	Sacramento, Sacramento River	38°35'N/121°30'W	2.9	2.6	0.3
18667	Montezuma Slough, Suisun Bay	38°05'N/121°53'W	4.2	3.7	0.6
<p>* Heights in feet referred to datum of sounding MLLW. Real-time water levels, tide predictions, and tidal current predictions are available at: http://tidesandcurrents.noaa.gov To determine mean tide range subtract Mean Low Water from Mean High Water. Data as of September 2012</p>					

