

Bay. A prominent point juts out about 0.5 mile on the east side of this bay 1.3 miles north of the entrance; an island is on the southeastern side of the point. Temporary anchorage for moderate-sized vessels may be had about 0.2 mile north of the point and 0.2 mile east of the west shore in 17 to 20 fathoms, mud bottom. The bay is unsurveyed, but it is known that the entrance is deep.

**Unakwik Inlet** is unsurveyed. Its entrance is 6 miles west of the west point of Glacier Island, 2 miles west of Wells Bay. The inlet extends about 18 miles in a northerly direction and averages 1.5 miles in width, narrowing to 0.5 mile at its northern end at **Mcraes Glacier**. **Olsen Island** is on the western side of the entrance; between it and the western shore there is foul ground. A rock awash at low water is reported about 1,200 yards east of the island. In entering, a 000° course heading for the bold point separating Unakwik Inlet from Wells Bay, depths greater than 100 fathoms were found, and these depths continued in midchannel for 8 miles past the north tangent of Olsen Island.

A bar at midpoint of the inlet, just north of Jonah Bay, extends from shore to shore blocking discharged glacier ice from passing south. The bar is marked by a small grass-covered islet about a third of the width of the channel west of the eastern shore. The best water over the bar appears to be just west of the islet, but the depth is unknown. A reef that bares, extends from the islet to the eastern shore. The ruins of an abandoned cannery and wharf are on the east shore just south of the bar. A rock, depth unknown, lies at the entrance to the cove south of the cannery ruins.

The west side of the inlet is indented by two coves and two bays. **Olsen Cove** is west of Olsen Island. There are several buildings of an abandoned fur farm near the southwest point of Olsen Island. An unnamed cove, 1 mile north of Olsen Cove, affords good anchorage for small craft near its south shore just west of the two small wooded islets marking the southern entrance point. Depths shoal gradually from 25 to 8 fathoms, sand and gravel bottom. This anchorage is exposed to the northeast.

**Siwash Bay**, on the west side of Unakwik Inlet 6 miles north of Olsen Island, affords excellent anchorage in 10 to 15 fathoms, mud bottom, about 0.2 mile west of the entrance island. This bay is about 2 miles long, 0.5 mile wide, and has a wooded island near the south shore at the entrance; the deep channel is to the north of the island. Entering on a midchannel course, the depth shoals rapidly to 10 fathoms just north of the island, continuing at that depth until well inside. Sheltered from all directions, this anchorage appears suitable for large vessels.

**Jonah Bay**, on the west side 9 miles north of Olsen Island, is crescent shaped and about 2.5 miles long. A glacial stream discharges at its head. The entrance is narrow and nearly blocked by a small island. The best water appears to be south of the island, but the depths are not known.

On the east side of the inlet 10 miles north of Olsen Island is a series of small coves known collectively as The

**Cow Pens**. A small ragged island lies about 0.5 mile offshore.

**Eaglek Bay**, midway between Unakwik Inlet and Esther Passage, is a large irregularly shaped bay extending 7 miles in a northerly direction. The southerly half is about 2.5 miles wide and the northerly half about a mile wide. There are two coves on the western side, each extending westward for about 1.5 miles. One large and several smaller coves are on the eastern side. The shores are extremely ragged and there are many wooded islets, bare rocks, and rocks awash. The large cove on the eastern side has numerous good anchorages for small craft. The bay is unsurveyed, and caution should be used because of the irregularity of the bottom. In entering, the best water appears to be about 0.2 mile west of the small prominent wooded islet 0.5 mile southwest of **Point Pellew**.

**Axel Lind Island**, 2.5 miles south-southwest of the entrance to Eaglek Bay, is high. The buildings of a fox farm are prominent on a stretch of gravel beach on the north side. Passage to the north is deep, but there are several off-lying dangers. Fishing craft use this passage and the one north of Bald Head Chris Island when bound for Port Wells via Esther Passage.

**Squaw Bay**, a mile east of Esther Passage and 1.5 miles north of Bald Head Chris Island, extends 2 miles in a northeasterly direction and averages 0.5 mile in width. Its eastern side is irregular, with numerous islands and rocks baring at various stages of the tide. The western side has no visible dangers and is unbroken except for a small cove about midway in. The cove affords excellent anchorage for small craft in 8 to 10 fathoms, sticky mud bottom. Fresh water may be obtained from a waterfall at the head of the cove. The bay is unsurveyed, but the best water appears to be near the western shore.

**Lone Island**, about 3 miles eastward of Perry Island, is wooded, comparatively level, and high. Foul ground extends nearly 0.5 mile northward. A 3½-fathom shoal 1.4 miles southward of the island is marked by a lighted bell buoy. A bank with a least depth of 5½ fathoms is between the shoal and the island.

**Dutch Group** consists of several wooded islands and bare rocks 4.3 miles north-northwest of Lone Island, the largest having elevations up to 150 feet. Foul ground extends 1.3 miles southward of the group to two prominent rocks about 5 to 10 feet high. An abandoned white building with a yellow roof is on the large northerly island of the Dutch Group and is prominent from offshore.

**Fool Island**, 3 miles west of the Dutch Group, is wooded and about 50 feet high. A rock which bares is 0.3 mile southward of Fool Island.

**Egg Rocks** are prominent bare rocks 1.5 miles westward of Fool Island.

**Perry Island**, in the northwestern corner of Prince William Sound, is wooded to a height of about 1,000 feet. It is prominently marked on its northeast side by a round peak, the summit of which is small, bare, and dome shaped. The bays indenting the island are anchorages for small craft only, on account of the foul, rocky, and broken bottom.

**Perry Island Light** (60°39.3' N., 147°55.8' W.), 35

feet above the water, is shown from a small white house on the southernmost point of the island. A rock, 14 feet high, is about 150 yards south of the light. A rock awash is 0.4 mile northwestward of the light.

Foul ground extends 0.5 mile eastward from the easterly end of Perry Island, and nearly 1 mile southeastward and southward from the southeast point of the island.

On the east side of Perry Island Light is a bay that is known locally as **South Bay**. Good anchorage is available for moderate-sized vessels in 10 to 24 fathoms, sand and mud bottom, in the cove at the head of the bay. The only known off-lying danger in the cove is a rock awash near low water about 50 yards off the point on the eastern side of the entrance. The buildings at the head of the cove are prominent from southward; the cove is a port of call for the biweekly mail boat from Cordova. **South Bay** should be entered with caution because of the irregularity of the bottom in the outer part.

**East Twin Bay**, indenting the north side of Perry Island, has anchorage for small craft on the southwest side of the head in about 11 fathoms; small area of soft bottom. A midchannel course should be followed until up with a prominent rock about 20 feet high, which lies near the middle 0.7 mile from the head. Pass northeastward of the rock and follow the northeast shore at a distance of about 150 yards. A rock with 1 fathom over it lies 450 yards 135° from the prominent rock and 275 yards from the northeast shore.

**West Twin Bay**, on the northwest side of Perry Island, affords no anchorage on account of the rocky, broken bottom. Small craft entering should favor the northeast side to the narrow part 1.3 miles from the head, and then favor the southwest side, passing westward of a rock, about 25 feet high, which lies near the middle 0.6 mile from the head.

From the point on the west side of the entrance to **West Twin Bay**, a chain of islets and foul ground extends over 1 mile northward.

**Perry Passage** is between Perry Island and **Culross Island**, 2.5 miles to the westward. **Wells Passage**, between Perry and **Culross Islands** on the south and **Esther Island** on the north, has widths of more than 2 miles. The two passages have depths of 100 to 250 fathoms.

**Esther Island** is mountainous, wooded to a height of about 1,000 feet, and the summits are bare rocks. The peak on the southeast point of **Esther Island**, and the sharp twin peaks on the southwest point, are prominent. A light, 48 feet above water, shown from a small white house, marks the southwest side of the island. Between this light and **Esther Passage** to the eastward are three unnamed and unsurveyed bays. The easternmost, 3.5 miles eastward of the light on **Point Esther** extends about 2 miles in a northerly direction. The entrance, 0.7 mile wide, is partly blocked by several wooded islets, bare rocks, and rocks awash. The interior of the bay is dotted with islets and rocks.

The middle bay, 1.3 miles eastward of the light, extends 1.7 miles north-northeastward, and averages about 0.2 mile in width. The entrance is constricted to a width

of 0.1 mile. An islet is 0.7 mile above the entrance and two rocks awash are toward the head of the bay. The shores are steep-to.

The westernmost bay, 0.7 mile eastward of the light, extends 1.2 miles northwestward and averages about 0.1 mile in width. Fishing craft find indifferent anchorage near the east shore southeast of the narrowest part where the bay widens to its maximum of 0.3 mile. Rocks awash extend about 100 yards southeast of the point forming the northwest extremity of this anchorage light. A sunken rock is near the head of the bay. In general, the shores are steep-to and depths are too great for convenient anchorage. About 0.5 mile from the head on the eastern side is a fresh-water stream that discharges from **Lake Esther**.

**Esther Passage** separates **Esther Island** from the mainland. The southern entrance, 7.5 miles east of **Point Esther** and 1.8 miles northwest of **Bald Head Cris Island**, is about 1.5 miles wide. The entrance is flanked by two wood islets. A rock awash at about half tide is about 0.3 mile east of the western islet. The bottom of the entrance is extremely irregular, varying in depth from 9 to 60 fathoms. Once inside, the water deepens rapidly to more than 100 fathoms for 2 miles or more. The passage trends in a northwesterly direction for about 10 miles, entering **Port Wells** about 8.5 miles north of **Point Esther** and 3.5 miles south of **Golden**; it is sharply constricted at its midpoint. The southern half averages 0.7 mile in width and the northern half, 400 to 250 yards. The passage is unsurveyed but appears to be clear; fishing craft use it regularly.

**Esther Rock**, 1 mile westward of **Point Esther**, is 22 feet high and sparsely covered with grass.

A reef, bare at lowest tide, is reported to extend about a mile off the south point of **Granite Bay**, on the west side of **Esther Island**.

**Culross Island** is mountainous and wooded to a height of about 1,000 feet. A light, 40 feet above water, shown from a small white house, marks the northeast point of the island.

**Culross Bay**, on the north side of **Culross Island**, is clear but a poor anchorage. The prevailing northeast winds send considerable swell up the bay. A small area of mud bottom is found near the head; it appears to be a soft, thin layer over rock, and anchors do not hold well in it. There is an abandoned mine at the head of the bay.

**Culross Passage**, between **Culross Island** and the mainland to the westward, is used occasionally by fishing craft and cannery tenders. It is narrow and congested and should be used only with local knowledge. The small bay on the east side a mile from the northern entrance affords good anchorage in 3 to 8 fathoms, mud bottom; fresh water can be obtained from the streams at the head of the bay.

**Port Wells** extends northward from **Wells Passage** past the west side of **Esther Island** for 13 miles to **Point Pakenham** where it divides into **Barry Arm** to westward and **College Fiord** to eastward. Offshore depths in **Port**

Wells are 100 to 200 fathoms. About 5 miles above the entrance to Barry Arm, **Harriman Fiord** extends 10 miles in a southwesterly direction. Gravel bars which uncover, extend across the entrance to **Harriman Fiord** from **Point Doran**.

**Bettles Bay**, on the west side of Port Wells 7 miles above Wells Passage, is reported free from dangers in midchannel. Good anchorage is available in 25 fathoms, mud bottom, in midbay 1 mile above the entrance, and in 22 fathoms, mud bottom, in the northeast corner of the bay.

There is good shelter for small craft in the lagoon at the head of the bay which can be entered by boats drawing up to 6 feet on the upper three-fourths of tide. Anchor in 5 to 10 fathoms, mud bottom.

**Hobo Bay** is on the west side of Port Wells just northward of Bettles Bay. A bar, covered about  $3\frac{1}{2}$  fathoms, extends across the entrance of Hobo Bay. Vessels entering follow the north side of the bay at a reported distance of 100 yards. There are several rocks bare at low water along the southern shore of the bay. A grassy rock lies a short distance offshore. A vessel entering this bay reported anchoring off the grassy rock in 5 fathoms.

**Golden** is a mining camp on the eastern shore of Port Wells, about 3 miles northeastward of Esther Passage. Steamers anchor 200 to 300 yards southward of the little island off Golden, in about 20 fathoms, rocky bottom. It is regarded as a poor anchorage and it is probable that the anchor will not hold with strong winds drawing down Port Wells. The area between the island and the shore uncovers.

**Pigot Bay**, on the west side of Port Wells just north of Passage Canal, has a rocky shore except at its head where sand and mudflats extend offshore about 0.2 mile and bare at low water. Bottom in Pigot Bay is heavy blue clay with good holding qualities. Depths near the entrance to Pigot Bay are too great for anchoring, but good anchorage is available for large vessels near the head of the bay in 30 fathoms. A small area 1 mile from the head of the bay affords good anchorage in 12 fathoms, but is difficult to find because of its limited extent. A similar area 0.2 mile from the head of the bay affords excellent anchorage for small vessels in 13 fathoms. Good anchorage is available for small boats in the northeast corner of the bay and in **Ziegler Cove**, on the north side of the bay immediately inside the entrance.

The ruins of an abandoned logging camp are at the head of Pigot Bay, and an abandoned mine is a short distance up the river which empties into the bay.

**Point Pigot** is the southeastern end of the peninsula between Pigot Bay and Passage Canal. Low valleys extend across the peninsula from Entry Cove and **Logging Camp Bay**. The south end of Point Pigot is a wooded, rocky headland 22 feet high. This headland is joined to the mainland by a sandy neck 6 feet high. A light is shown from the southern tip of Point Pigot. A rock bares at lowest tides 0.8 mile eastward of the light. A similar rock is 200 yards west-northwestward of the light.

Immediately westward of Point Pigot is **Entry Cove** which affords good anchorage in 13 fathoms, soft bottom, with swinging room for one vessel up to 200 feet in length.

**Cochrane Bay** empties into the south end of Port Wells opposite Point Pigot. The middle of the bay has depths of 100 to 200 fathoms and the shores are steep-to.

**Surprise Cove** is on the west side of Cochrane Bay just south of the entrance. The southwest arm of the cove appears clear of dangers with 33 fathoms in the middle decreasing toward the head, near which indifferent anchorage is available in 12 to 15 fathoms. The thin layer of glacial silt over the rocky bottom is poor holding ground. The western arm of Surprise Cove has a restricted entrance and can be entered only by small craft.

**Blackstone Bay** empties into the south side of Passage Canal southwest of Point Pigot. The middle of the bay has depths of 100 to 200 fathoms as far as **Willard Island**, a large island about 450 feet high near the head of the bay. A rock, bare at low water, is 0.1 mile north of the island. There are no known anchorages in the bay.

Depths along the west side of Willard Island range from 50 to 80 fathoms. Glacial moraines, with little water over them at low water, extend from both shores of Blackstone Bay to Willard Island midway of the island's length. **Blackstone Glacier** is active, and there are generally numerous small icebergs in the head of the bay.

**Passage Canal** has its entrance at the southwest end of Port Wells between Point Pigot and **Blackstone Point**, the northern extremity of the peninsula separating Cochrane and Blackstone Bays. The canal trends north-westward for 4 miles, then westward for 8 miles.

The principal approaches to Passage Canal and the canal itself offer little difficulty for navigation with the aid of the chart. These waters, including the Knight Island group and both shores of Knight Island Passage, are characterized by rocky and exceedingly broken bottom. Differences of 50 fathoms between adjacent soundings are not uncommon, and it is probable that on the broken areas there may be less water and possibly dangers not disclosed by the survey. As a measure of safety, vessels should avoid areas where abrupt changes are indicated by the chart to depths less than 50 fathoms.

Passage Canal is 1 to 1.5 miles wide, has great depth and is clear except in a very few places near the shores. The shores rise abruptly and are wooded to about 1,000 feet. The higher peaks are bare or snow-covered rock.

**Chart 8521.—Decision Point** is on the south side of Passage Canal about 3 miles westward of Point Pigot. **Decision Point Light** ( $60^{\circ}48.4' N.$ ,  $148^{\circ}27.2' W.$ ), 35 feet above the water, is shown from a small white house on the north end of the point.

An executive order of June 11, 1952, established Passage Canal westward of Decision Point as **Whittier Defensive Sea Area**. No person, other than persons on public ves-

vessels of the United States, shall enter the area, and no vessels or other craft, other than public vessels of the United States, shall be navigated into the area, unless authorized by the Secretary of Defense or such officer as he may designate. On August 3, 1952, the Chairman of the Joint Chiefs of Staff was designated the authorizing officer.

**Shotgun Cove**, on the south side of Passage Canal 6 miles above Point Pigot, has depths of 30 to 35 fathoms, muddy bottom, through the middle. Foul ground fills the narrow parts of the head of the bay; approaching slowly, a small vessel can select anchorage just below this foul ground, in 15 to 20 fathoms.

The bight on the southeast side of Shotgun Cove is obstructed near the middle by a rock covered one-half fathom. Anchorage with a clear width of 0.3 mile can be had in the northeasterly part of this bight, in 15 to 20 fathoms, mud bottom.

**Trinity Point** is on the south side of Passage Canal 3 miles west of Decision Point. Tiny **Emerald Island** is 0.4 mile west of Trinity Point. A light, 39 feet above water, is shown from a small red house on the outer end of the narrow point between Trinity Point and Emerald Island. **Small Emerald Bay**, which extends southwestward from the island, offers good shelter and anchorage for small craft in 3 to 5 fathoms, mud bottom; the entrance is narrow but clear of dangers.

Anchorage in 12 to 18 fathoms, sticky bottom, can be had on **Bush Banks** which extend 0.3 mile from the south side of the canal at a point 1 mile above Emerald Island and 8.5 miles from the head. The least depth is  $4\frac{1}{2}$  fathoms at the southwest end of the shoal.

Small craft can anchor in the cove at the northwest end of the head of the canal, in 6 to 12 fathoms.

**Whittier** (1960 population 168; P.O.) is the Alaska Railroad terminus on the south side of Passage Canal, 1.5 miles from the head. In 1964 the port was in caretaker status. The town has a sawmill and a wood-treatment plant.

The March 1964 earthquake caused a bottom subsidence of 5.2 feet at Whittier. Until a complete survey is made of the area, caution is necessary because depths may vary from those charted and mentioned in this Coast Pilot.

**Wharves**.—There are two main docks at Whittier, both which are operated by the Alaska Railroad. The 1,100-foot long marginal wharf with depths of about 30 feet alongside its face handles general cargo and sea trains. **Long Pier**, 425-foot long with 36 feet alongside, is about 100 yards northeastward of the marginal wharf. Gasoline, diesel oil, and water are available in limited quantities at the marginal wharf.

The two oil T-piers westward of the marginal wharf were completely destroyed by the March 1964 earthquake. Emerged ruins may exist in this spoil area; the eastern end of which is marked by a buoy.

**Quarantine, Customs, and Immigration** are handled by Anchorage officials. In some cases, however, an employee of the Alaska Railroad at Whittier is designated to handle the functions of customs and immigration.

**Anchorage**.—Large vessels sometimes anchor clear of the  $4\frac{1}{2}$  fathom shoal on Bush Banks about 2 miles north-eastward of Whittier or in Pigot Bay.

**Routes**.—Eastward: From the entrance point to Prince William Sound, 1.5 miles southwest of Cape Hinchinbrook Light, set courses to pass 2 miles east of Smith Island, 1.5 miles north of Point Eleanor Light, 1.5 miles southwest of Perry Island Light, 1 mile northeast of Culross Island Light, 0.5 mile south of Point Pigot Light, 0.5 mile north of Decision Point Light, 0.5 mile north of Trinity Point Light, and thence to Whittier, clearing the south shore by 0.5 mile until up to the waterfront.

Westward: Enter Prince William Sound through Ellington Passage, clear the east side of Evans Island by 1 mile, then pass 0.5 mile east of Pleiades Light, 2 miles east of Crafton Island Light, and follow the route mentioned above.

Vessels from Valdez usually use Perry Passage when going to Whittier.

**Tides and currents**.—The diurnal range of tide is 12.1 feet at Whittier. The currents have little velocity in Passage Canal.

**Chart 8517**.—**Port Nellie Juan** extends 23 miles in a southwesterly direction from its entrance between Culross Island and the mainland to the south. **Applegate Island**, on the northwest side of the entrance, is low, flat, and wooded. **Port Nellie Juan Light** ( $60^{\circ}35.9' N.$ ,  $148^{\circ}06.0' W.$ ), 23 feet above the water, is shown from a small white house on the north end of the point on the southeast side of the entrance.

Port Nellie Juan is divided into three right-angled reaches into which many glaciers discharge. The innermost reach is **Kings Bay**. Midchannel depths of more than 100 fathoms are available to near the head. In general the reaches are deep close to the shores which are indented by numerous bays and small inlets.

Areas in front of the glaciers should be approached with caution. The moraines are often of great extent, and the water over them shoals rapidly to a fathom or less. This is particularly true at the head of Kings Bay where the water is shoal 0.2 to 0.5 mile from shore, then deepens rapidly to more than 50 fathoms.

**McClure Bay**, the first of two bays which indent the southeast shore of the first reach, is deep and narrow and extends in a southerly direction for about 5 miles. It is from 80 to 100 fathoms deep, free from hidden dangers, and has bold shores. The upper part of the eastern arm at the head of the bay is foul. Vessels requiring little swinging room may anchor at the entrance of this arm in 18 fathoms, mud bottom. The western arm is clear in midchannel and affords shelter for small vessels.

An inactive cannery and wharf are in the cove on the east side of McClure Bay near the entrance. The main

face of the wharf is 325 feet long with 16 feet alongside near the break and 31 feet near the corner; large vessels dock portside-to.

Two rocks with little water over them are in the cove, one on the north side just east of the wharf, and the other in midentrance and marked by a buoy. The cove is so small that it affords anchorage only for small craft.

**Blue Fiord**, the second bay, is at the head of the first reach, and extends about 4 miles in a southerly direction to the moraine of **Ultramarine Glacier**. The shores of the fiord are steep-to and depths in midchannel are 33 to 100 fathoms.

There are three prominent bays along the southern shore of the middle reach of Port Nellie Juan. They are **Derickson Bay**, **Deep Water Bay**, and **Greystone Bay**. Along the north shore of this reach are long and narrow East Finger and West Finger Inlets, with Shady Cove midway between them.

**Nellie Juan Glacier**, at the head of Derickson Bay, is the most active glacier in the area and the bay is often filled with small icebergs.

Because of the great depths, there are few anchorages in Port Nellie Juan. Indifferent anchorage for large vessels can be found in the bight just inside the point on the southeast side of the entrance. The southerly of the two coves in this bight has a wide, even, gravel shore that is excellent for beaching a small vessel.

Another indifferent anchorage is available for vessels up to 250 tons 0.7 mile southwest of **Division Point** between Blue Fiord and Derickson Bay. Depths of 18 fathoms can be found 300 yards off the entrance to a small indentation. The thin layer of mud over rocky bottom is only fair holding ground.

Small craft can find indifferent anchorage in some of the bights on the northwestern side of the first reach. The best of these is in the area west of **Mink Island** where the depth is about 15 fathoms, mud bottom. Good anchorage is available for vessels up to 300 tons in the upper end of West Finger Inlet in 15 fathoms, and in Shady Cove, 14 fathoms in the middle and 8 fathoms near the head, mud bottom.

**Main Bay**, 4 miles southeastward of Port Nellie Juan, is deep and generally clear away from the shores, but affords no anchorage. Foul ground makes off both entrance points.

**Falls Bay**, 2 miles southeastward of Main Bay, affords no anchorage and is open to the prevailing northeasterly weather. The main part of the bay is clear and deep. Rocks make out from the points at the entrance, contracting it to a width of 0.2 mile in which the least found depth is about 12 fathoms.

**Crafton Island** is a mile long and wooded. At its north end are rocky bluffs about 100 feet high, while its southern part is lower and has sandy beaches in places. Two low islets with sandy beaches are off its south end. A light, 70 feet above the water, is shown from a small white house at the northeast end of the island.

Crafton Island is surrounded by foul ground to a distance of about 0.5 mile on its east and south sides,

where no sounding has been done. An exceedingly broken area extends over 2 miles southeastward from the island. A rock, bare at about half tide, is 1 mile south-eastward from the south end of the islets. Vessels should avoid all broken areas in this vicinity where depths less than about 50 fathoms have been found.

The passage westward of Crafton Island is foul along the shore of the islets, and three rocks which uncover are in the middle of the south entrance. This passage should be used only by small craft, proceeding with care and preferably at low water. The channel favors the west shore from the south entrance until abreast the middle of Crafton Island.

The clearer channel to Eshamy Bay follows the shore northward from Point Nowell and has a width of about 0.8 mile. Differences of 50 fathoms between adjacent soundings are not uncommon in this locality. Foul ground extends 350 yards northward, and rocky broken ground of 14 fathoms, or less, extends 0.6 mile northward from the south point at the entrance of Eshamy Bay.

**Eshamy Bay**, between Point Nowell and Crafton Island, affords anchorage only for small craft in 8 to 11 fathoms, in the small cove back of the islands and rocks in the southeast corner of the bay. The better entrance is through the middle of the deep, narrow channel between the small islands, and the eastern shore. **Eshamy Lagoon**, with a saltery at its head, extends westward from Eshamy Bay, but its foul entrance with strong currents makes it inaccessible for strangers.

**Point Nowell**, 4.5 miles southward from Crafton Island, is a small wooded hook, about 50 feet high, back of which the land rises abruptly. The cove formed by the hook is about 300 yards in diameter and apparently clear, and affords anchorage for small craft in about 5 fathoms.

**Knight Island**, on the west side of Prince William Sound is 22 miles long and very rugged, the peaks rising to 3,261 feet. It is wooded to about 1,000 feet, and above this is grass covered. Three mountains, sparsely wooded islands, called Disk, Ingot, and Eleanor, extend 6 miles northward from Knight Island to Point Eleanor, the north end of the group.

**Eleanor Island** has bluff, rugged shores. Broken ground extends 0.4 mile northward and northwestward from Point Eleanor the north point of the island. A light, 45 feet above water and shown from a small white house, marks Point Eleanor. **Northwest Bay**, on the northwest side of Eleanor Island, is deep and clear. There is anchorage for small vessels in the south arm, about 0.4 mile from the head, in about 20 fathoms.

Near the eastern point of Eleanor Island, 1.8 miles southward of Point Eleanor, is a rocky islet with a few trees and with foul ground on its shore side. A bare rock 0.2 mile south of the islet should be given a berth of 0.3 mile. A group of prominent bare rocks, close together and about 12 feet high is 0.6 mile off the southeastern point of Eleanor Island. Between them and Eleanor Island is broken ground with depths of 6 to 7 fathoms. A bare rock about 5 feet high is 0.6 mile southwest of

the group; it should be given a berth of over 0.4 mile from the southeast.

**Upper Passage**, separating Eleanor and Ingot Islands, is generally deep and is suitable for small craft. **Block Island**, 1 mile long with its northern end joined at low water to Eleanor Island, narrows the southern part of the passage to about 400 yards. About 600 yards southeast of Block Island is a ledge with 5 fathoms over it, possibly less.

**Entrance Island**, high, and wooded, is 0.3 mile south of Eleanor Island and on the north side of the southern approach to Upper Passage. It is surrounded by deep water.

**Sphinx Island**, on the south side of the southern approach to Upper Passage and 0.4 mile east of Ingot Island, is high and wooded, and has deep water around it. About 0.9 mile southeast of Sphinx Island is a rocky area with a least known depth of 18 fathoms.

**Ingot Island** is between Upper and Lower Passages. A prominent high, wooded island is 0.2 mile off the northwest end of Ingot Island. Two small bare rocks, close together and nearly awash at high water, are 0.5 mile southeastward from the south point of Ingot Island. Broken ground extends 0.5 mile southwestward from the rock to a ledge covered  $3\frac{1}{4}$  fathoms.

**Disk Island** is separated from Ingot Island on the east by **Foul Pass**, a narrow passage blocked by reefs. A landlocked bay with two narrow entrances makes into the west side of the island. An excellent anchorage for small craft can be found in the bay in 5 to 13 fathoms, mud bottom; good shelter from all wind. Enter through the south entrance which is 50 yards wide and has a least depth of 3 fathoms.

**Lower Passage** is a deep navigable channel, suitable for small vessels, between Ingot Island and the northern end of Knight Island. Broken ground, on which the least known depth is  $6\frac{1}{2}$  fathoms, extends into the passage 0.2 mile from the western entrance point of Louis Bay. A rock that uncovers at half tide, is 350 yards from the western shore, 0.8 mile inside the northwest end of the passage. From this rock to the head of the cove, 0.5 mile southward, is foul ground.

A rock covered  $4\frac{1}{2}$  fathoms, possibly less, is nearly 0.4 mile northwestward from the northern end of Disk Island. Another rock with 5 fathoms over it lies nearly 0.5 mile from Ingot Island and over 0.7 mile  $042^\circ$  from Passage Point, the north end of Knight Island. These rocks are well out of the usual track of vessels going through Lower Passage.

**Louis Bay**, indenting Knight Island about halfway through Lower Passage, affords anchorage for small vessels 250 to 300 yards from the head of either of its two arms, in about 15 fathoms. The western arm is clear so far as known.

The eastern arm of Louis Bay has a very broken bottom, and small vessels entering should proceed with caution. A rock covered 5 feet is 175 yards from the eastern shore and 350 yards northward from the entrance of the eastern arm. The arm is 0.1 to 0.2 mile wide; a ledge

makes out about 30 yards from the wooded islet on the west side of the entrance. When inside the entrance, favor the western side to avoid three rocks which bare at lowest tides.

**Herring Bay**, at the northwest end of Knight Island, has no desirable anchorage, and is characterized by much foul ground and very broken bottom, with deep water close to the shores and dangers. Vessels navigating the bay should proceed with caution, especially in the vicinity of broken areas with depths less than about 20 fathoms, and preferably at low water. The entrance is clear except along the eastern shore, which is foul. A prominent rock about 4 feet high is near the center of the bay; the best channel to the upper part of the bay is eastward of the rock. Water can be obtained from a fall in the southeast arm.

**Herring Point** is the north end of a narrow ridge, about 1,000 feet high, forming the west side of Herring Bay.

**Smith Island**, near the center of Prince William Sound, is high and wooded, and is lowest at its southwest end. Broken rocky bottom extends 3 miles northeastward from Smith Island, and a lighted bell buoy is 0.3 mile southward of a 7-fathom patch 1 mile from the island.

**Little Smith Island**, close westward of Smith Island, is bluff, high, and wooded. Rocky patches of  $4\frac{1}{4}$  to 18 fathoms lie about 1.5 miles northward of the island. A rocky area of 9 to 10 fathoms extends 1 mile southward from the island.

**Seal Island**, 5.5 miles southward of Smith Island, is wooded, high, and rounded in outline. On the northwest side of the island is a light, 45 feet above the water, shown from a small white house. Close to the east end of the island are two bare rocky islets, and about 0.1 mile off the west end is a small rock which uncovers 8 feet.

Rocky, broken areas extend 1 mile northeastward and northward from Seal Island. **Pennsylvania Rock**, 1 mile northward of the island and marked by a buoy, is covered  $2\frac{1}{4}$  fathoms. About 0.8 mile southwestward of the island is a  $5\frac{1}{4}$ -fathom rocky area.

Vessels generally use the channel between Seal and Smith Islands rather than the channels to the southeastward.

**Chart 8551.**—The western entrance of Prince William Sound between Cape Cleare and Cape Puget is divided into a number of passages between the islands. They are described in the following order: Montague Strait, Latouche Passage, Elrington Passage, Prince of Wales Passage, and Knight Island Passage.

**Chart 8515.**—Montague Strait, between Montague Island on the east and Latouche and Knight Islands on the west, is the broadest of the passages westward of Montague Island leading from the sea to Prince William Sound. The strait affords an unrestricted channel 4.5 miles wide. Below the northern end of Latouche Island the strait is seldom used as vessels generally proceed via Elrington Passage. Above that point the regular steamer

route to the eastern part of Prince William Sound is by way of the passage westward of The Needle, Green Island, and Seal Island, thence through the passage between Seal and Smith Islands.

The western side of Montague Island is heavily wooded to an elevation of 900 feet. Generally rugged with many deep, steep-walled recesses near its high levels, it retains numerous patches of snow and ice throughout the summer.

**San Juan Bay** is an open bight just northward of Cape Clear. The sand beach at the head of the bight is backed by a large tidal swamp which drains through a small stream. Landings in this bight are usually difficult due to the surf.

**Stair Mountain**, just north of San Juan Bay, is a prominent conical-shaped peak which shows unmistakably from the south and southwest. The summit is bare; the slopes have a scattering growth of trees.

**Point Bryant** is a rounding point of high eroded bluffs, about 3 miles north of San Juan Bay. A rock, awash at extreme low tide, is about 300 yards off the point. The rocky shore is fringed with heavy kelp.

**Macleod Harbor**, on the east side of Montague Strait, 6.5 miles northward from Cape Clear, is free from dangers and is an excellent anchorage protected from all directions except southwest. **Point Woodcock**, on the north side of the entrance, is a rocky bluff about 50 feet high and wooded on top. The point is fringed by a rocky, kelp-covered reef. The southern entrance point is gently rounding. The head of the harbor is marked by extensive mudflats.

**The March 1964 earthquake caused a bottom uplift of 31.5 feet in Macleod Harbor. Shoaling and new dangers may exist requiring extreme caution until a complete survey is made of the area.**

Large vessels entering Macleod Harbor favor the northern shore and anchor in 14 to 17 fathoms, muddy bottom, about 0.3 mile off the shingle beach 1 mile from the head of the bay. In making this anchorage, care should be taken to avoid the mudflats which rise very sharply. Severe williwaws draw down through the harbor, but the holding ground is good and the anchorage is safe. Small craft find anchorage farther in close to the northern shore and to the head of the bay in 4 to 10 fathoms, mud bottom. Small-craft mooring piles at the head of the harbor, are now dry at low water due to the upheaval caused by the March 1964 earthquake. Drastic changes have occurred and the overall size of the bay is greatly reduced.

**Hanning Bay**, indenting the west side of Montague Island 13 miles northward of Cape Clear, is a good anchorage with easterly winds. Shoals extend nearly 0.4 mile off from the streams at the northeast and southeast parts of the bay, and a reef extends 0.2 mile from the point on the eastern side. The best anchorage with southerly winds is about 0.4 mile from the south side, with Danger Island open from the south point at the entrance bearing 258°, and **Point Basil**, the north point at the entrance, bearing between 005° and 348°, in 15 to 16 fathoms, sticky bottom. With northwest winds, a better berth can be

had 0.3 to 0.4 mile off the cove on the north side, 0.6 mile inside the entrance, in 5 to 8 fathoms, hard bottom. When entering, give the points at the entrance a berth of 0.4 mile.

**The Needle** is a flat-topped, steep-sided rock, about 45 feet high, in Montague Strait 3.8 miles from the nearest point of Montague Island and 5.5 miles southeastward from Point Helen the southern extremity of Knight Island. A depth of 4½ fathoms is 1 mile northeastward of The Needle.

**Little Green Island**, heavily wooded and 100 feet high, is 6 miles northward of The Needle. A fringe of rocks surrounds the island and a kelp-marked reef, baring at various stages of the tide, extends 1 mile off the southern end of the island and terminates in a 1-foot rock. A rock, 1.5 miles eastward of Little Green Island, uncovers 8 feet. The rock is close to the 50-fathom curve and has little kelp on it.

**Green Island**, between Knight Island and the northern part of Montague Island, is wooded. The highest elevations are near the eastern side of the island, and slope gradually to the north and south ends. Very foul ground surrounds the island. Two wooded islets 100 feet high, several small islets, and numerous rock and shoal spots are along the northwest shore of Green Island. These include a prominent outlying rock, 25 feet high, 1.2 miles northwestward of Putnam Point. A small 15-foot rocky islet is about 1 mile southwestward from the sharp point forming the western end of Green Island.

The 38-foot fishing vessel **MINNIE S** grounded on a reef which uncovers, 1.1 miles west of Putnam Point. The wreckage is visible at low water.

**Gibbon Anchorage** is a secure harbor for craft up to 500 tons in the cove about the middle of the northwest side of Green Island. Passing 0.3 mile southward of the outlying prominent 25-foot rock, steer 126° for **Putnam Point**, the prominent wooded point with a small bluff on the southwest side of the cove. When about 0.2 mile from shore, steer more eastward and pass midway between Putnam Point and the rock, awash at high water, 400 yards northward of the point. Anchor in the cove southeastward of the rock, in 6 to 8 fathoms. A rock bares at half tide 175 yards northeastward of the point west of Putnam Point, and the southerly of two rocks, bare at extreme low water, lies 0.6 mile 133° from the outlying 25-foot rock.

**The March 1964 earthquake caused a bottom uplift of 7 feet in Gibbon Anchorage. Shoaling and new dangers may exist requiring extreme caution until a complete survey is made of the area.**

**Passage between Green and Montague Islands.**—The middle of the eastern side of Green Island is characterized by a prominent sand and gravel point, sparsely wooded. A group of five rocky islets is 1 mile off this point; 62-foot **Channel Island**, the highest of the group, is tree covered. A sandspit, terminating in low rocks, extends 0.4 mile northeast from this group.

Between Channel Island and Montague Island, the bottom is very irregular. Several 5¼- to 10-fathom spots

on which there may be less water, were found in this area. The best water apparently is about 0.3 mile southeastward of the islet.

**Port Chalmers**, on Montague Island 5 miles south of Graveyard Point, lies southward of **Gilmour Point** and extends 1.2 miles in a northeast direction. At its northeast end are two small lagoons, the outer one having about  $3\frac{1}{2}$  feet of water along its southerly shore.

A small wooded island, 165 feet high, is 1 mile southwestward of Gilmour Point. A rock 10 feet high is southeast of the island. A kelp-marked rock that uncovers 4 feet and a  $1\frac{1}{4}$ -fathom rocky shoal are about 0.5 mile northward of the island, with a  $1\frac{1}{2}$ -fathom rock about 0.4 mile farther north.

The approach to Port Chalmers is between the island and the  $1\frac{1}{4}$ -fathom shoal. A group of kelp-marked rocks that uncover 3 feet is 0.4 mile inside the island, on line with the head of the port. The group is passed to the northward in entering. A reef, covered at extreme high tide, makes out 150 yards from the northern shore, 0.6 mile northeast of Gilmour Point.

Anchorage for small craft can be had in all weather at the head of Port Chalmers, between the reef and the lagoon entrance. There is excellent holding bottom of mud in 6 to 10 fathoms. A range (astern) of Channel Island off Green Island with Horn Mountain on Knight Island, can be used to pass 400 yards northward of the 165-foot island and avoid the dangers in the approach. The rock 0.4 mile northeastward of Wilby Island, uncovers 2 feet. Another rock, which uncovers  $1\frac{1}{2}$  feet, is 0.8 mile west-southwest of Wilby Island. Mariners should exercise caution in navigating these waters. Numerous shoals and rocks charted at 1 to 3 fathoms have been seen to bare at minus tides due to approximately 11-foot of uplift from the March 1964 earthquake.

Small cannery tenders frequently anchor in 12 to 14 fathoms about 0.2 mile inside the 95-foot island southwestward of the 165-foot island. To enter this area pass midway between the two islands. On the upper half of the tide small craft drawing not more than 5 feet enter midchannel into the lagoon at the head of the port; they can lay in the lagoon at all times in any weather, except during extreme ranges of tide.

The small bay just north of Gilmour Point offers good protection and anchorage in 2 to 8 fathoms, mud bottom. The entrance is clear of dangers on a midchannel course.

**Stockdale Harbor**, just south of Graveyard Point, has two small tree-covered islets in the southern part of the harbor. Its northern half is clear except for a kelp-marked  $1\frac{1}{4}$ -fathom shoal 0.4 mile off the northern entrance point. Anchorage can be had in 15 to 20 fathoms near the first light in the north side of the harbor. Small boats can anchor at the head of the harbor. The chain of detached shoals and rocks extending along the middle of the harbor northward of the islets must be avoided.

A  $2\frac{1}{4}$ -fathom rock, lightly marked by kelp, is 1.3 miles southwest of Graveyard Point.

**Montague Point** is the large rounded northern end of the west side of Montague Island. The shoreline is foul from Graveyard Point to Montague Point.

**Applegate Rock**, 2 feet high, is the highest part of the extensive kelp-marked reef area midway between Seal and Green Islands. The area contains several rocks which almost bare and should be avoided. At the northeastern end of this area is a  $4\frac{1}{2}$ -fathom spot 3.5 miles  $162^\circ$  from the summit of Seal Island. Detached from the area's western limit is a  $2\frac{1}{2}$ -fathom spot 5.2 miles  $196^\circ$  from Seal Island summit.

The passage between Seal Island and the reef area has ample depth for a width of about 2 miles. The broken bottom within 1.5 miles of Seal Island and that adjacent to the reef area should be avoided.

The passage between the reef area and Green Island has ample depth for a width of about 1 mile. The 9-fathom spot and the broken bottom in its vicinity, about 2 miles northwestward of Green Island, should be avoided. The 25-foot rock 1.2 miles off Putnam Point is a good leading mark in entering the passage from northward. Heading for this rock on course **222°** until about halfway through the passage, a vessel will be assured of deep water.

**Latouche Island**, on the western side of Montague Strait, is wooded to an elevation of about 500 feet, and above this is covered with moss and bushes, except the highest peaks, which are bare. The eastern shore is precipitous and the 100-fathom curve is less than 0.3 mile off in places.

**Danger Island**, 1.4 miles southward of Latouche Island, is low and wooded. There is a prominent lone tree on the southeast point of the island which is surrounded by a complex group of reefs and rocks. The channel between Danger Island and Latouche Island has a least known depth of  $2\frac{3}{4}$  fathoms. This channel is used by fishing boats but is not recommended for large vessels.

**Point Helen**, the southeastern extremity of Knight Island, is marked by **Point Helen Light** ( $60^\circ 09.2' N.$ ,  $147^\circ 45.8' W.$ ), 35 feet above the water and shown from a small white house.

**Hogan Bay**, on the east side of Knight Island, 2.5 miles northward of Point Helen, has anchorage in the middle, 0.6 mile inside the entrance, in 16 to 20 fathoms. The bottom is rocky and uneven, and the anchorage is exposed eastward. Small craft can pass through the narrow channel at the head of the bay and find secure anchorage in the inner cove in 12 fathoms or less. The spit on the west side of the channel is bold, and should be favored when entering the inner cove.

**Snug Harbor** is on the east side of Knight Island, 6.7 miles northward of Point Helen. Its western arm is 0.3 mile wide and clear near midchannel, and has secure anchorage at its head in 12 to 17 fathoms. Anchorage, exposed to northerly and northeasterly winds, can be had in the broad cove on the south side of the harbor in 12 to 15 fathoms, rocky bottom. **Discovery Point**, the southern entrance point to Snug Harbor, is bold and high.

**Marsha Bay**, 5 miles northward of Discovery Point, has a crooked narrow entrance, and is suitable only for small craft. The depths are great except at its north end, where anchorage can be selected in 15 fathoms or less. The entrance is between two sunken rocks, and the channel then leads southward of the islands which choke the mouth of



the bay. Enter in midchannel between the outer island and the south point of the bay, then favor the south point of the islands when passing through the narrowest part of the channel.

**Manning Rocks** are about 2 miles off the entrance to Bay of Isles. They are three pinnacles, with depths of 5, 9, and 23 feet, on the south, middle, and north, respectively; the distance south to north being 0.9 mile. They are surrounded by deep water and are the worst dangers on the east side of Knight Island. Between Manning Rocks and the foul ground in the entrance to Bay of Isles the bottom is very irregular, although the least depth found is 8 fathoms. This area should be avoided.

**Bay of Isles**, on the eastern side of Knight Island, has numerous islets and pinnacle rocks, sunken and awash, and is suitable only for small vessels proceeding with caution and preferably at low water. There is secure anchorage in the **South and West Arms**, the latter being easier of access. The depths in the bay are great, and the deep water extends close to the rocks, which are not marked by kelp.

Foul ground extends 0.5 mile southeastward from the northern point in the approach to Bay of Isles. At the end of the foul ground is a rock with 10 feet over it, 0.9 mile 073° from an island near the northern shore.

To enter Bay of Isles, pass in midchannel northward of the islets in the middle of the bay. Continue 0.5 mile past the islets, and pass in midchannel westward of the islands near the southern shore. Then keep the northern shore distant about 150 yards in entering West Arm. Anchor in the middle of the broad part of the arm in 9 to 11 fathoms.

**Chart 8523.**—**Latouche Passage** has its seaward entrance between Danger Island and Elrington Island. The entrance bar, with depths of 5½ to 11 fathoms, has sometimes been crossed by large vessels proceeding westward from Latouche. The recommended route, however, is by way of Elrington Passage and the northern part of Latouche Passage. A 2¾-fathom spot 0.3 mile west of Danger Island should be avoided.

Occasionally with westerly winds large pieces of glacial ice drift into Latouche Passage from Knight Passage.

Latouche Passage, east of Elrington Island, is 7 miles long and 0.8 to 1 mile wide with depths under 30 fathoms in most places. Anchorage can be selected nearly anywhere in this channel where the depth is suitable. Avoid the eastern part of the passage in the vicinity of the crescent-shaped islet 2.2 miles southwest of Chicken Island. Much kelp lies in the passage back of the islet.

From **Point Grace** to the north end of Elrington Island, a distance of 5 miles, Latouche Passage is about 1.8 miles wide, with deep water. A wooded islet, with a grass-covered rock close to its north end, is near **Evans Island** and 0.8 mile northward of **Bishop Rock**.

**Latouche**, on the west side of Latouche Island 2.3 miles southward of Point Grace, is the site of the abandoned copper mine of the Kennecott Copper Corp. The buildings are in ruins.

The cove immediately eastward of **Powder Point** is shoal, and a reef makes out 100 yards from the point. Anchorage can be had about 600 yards northward of Powder Point in 10 to 15 fathoms.

A rock with 2½ fathoms over it lies off the point next southward from Powder Point.

**Chicken Island**, 3.5 miles southwestward of Point Grace, is separated from Latouche Island by a pass 350 yards wide with a depth of only 4 feet.

**Horseshoe Bay** is on the west side of Latouche Island, 4.5 miles southwestward of Point Grace. Its southern half is shoal; small craft entering close to the north point of the bay, can anchor in its north end in 18 to 20 feet. Just northward of the south point of the bay is a rock covered at high water. Vessels can anchor about 0.3 mile off the entrance in 16 to 18 fathoms.

**Elrington Passage**, westward of Elrington Island, is generally used by vessels proceeding between Prince William Sound and points to the westward. It is 8 miles long, 0.5 to 1 mile wide, deep and clear. Anchorage is not easily found on account of the great depths. The passage is well marked.

**Currents.**—The flood current sets northeastward and the ebb southwestward with a velocity of about 1.5 knots.

**Elrington Island**, high and mountainous, lies between Latouche Passage and Elrington Passage. The southwestern end of the island has three prominent points between which are South Twin Bay and North Twin Bay.

**Point Elrington**, the southwestern end of the island, is a small hill, high and wooded, with cliffs at the water, and is joined to the island by a sand and gravel neck just above high water. A high hill, 1.4 miles eastward of the point, has a low divide about 100 feet high at the east end. **Point Elrington Light** (59°56.2' N., 148°14.9' W.), 85 feet above the water and shown from a small white house, marks the extremity of the point.

**South Twin Bay** is free from dangers and affords convenient anchorage in 17 to 20 fathoms, hard bottom with patches of sand and gravel. It is exposed to westerly and southwesterly winds.

**North Twin Bay** is free from dangers except for a rock awash at low water about 250 yards off the south shore 0.5 mile northeastward of the southern entrance point. Anchorage can be found in the center of the bay in 13 to 17 fathoms. Of the two bays, the best shelter is usually found in the southern one.

The north point at the southwest end of Elrington Island is a high hill, connected with the island at its southeast end by a long, low, wooded neck. **Lonetree Point**, the most northern extremity of the point, is marked by a prominent lone tree and a light, 34 feet above the water, shown from a small white house on a skeleton tower.

On the southeasterly end of Evans Island is a light, 20 feet above the water, shown from a small red house.

A high island is in the bend at the south end of the passage close to Elrington Island, from which its southeast point is separated by a narrow pass dry at low water.

A pyramidal pinnacle rock, about 8 feet high with grass on top, is about 250 yards off the north point at the

southwest entrance to Elrington Passage, about 1.4 miles northeastward of Lonetree Point Light. A grass-covered rock, about 10 feet high with some brush on its summit, is near the angular mountain point on the east side of the passage, 4 miles from the north entrance. In the southeast angle of the passage, 1.4 miles southward of the grass-covered rock, anchorage can be had in 5 to 20 fathoms, muddy bottom, depending on the swinging room required.

The north end of Elrington Passage is marked by a daybeacon on the northwestern point of Elrington Island and by **Elrington Passage Light** ( $60^{\circ}02.8' \text{ N.}, 148^{\circ}00.5' \text{ W.}$ ), 25 feet above the water and shown from a small white house on the southern extremity of the island westward of Bettles Island.

**Sawmill Bay**, indenting the east side of **Evans Island** near the northern entrance to Elrington Passage, has several canneries and wharves along its shores. The canneries in 1964 did not operate. The end of the long peninsula on the southeast side of the inner part of the bay is marked by a light, 12 feet above the water, shown from a small white house and visible through the entrance northward of Bettles Island. The entrance from Elrington Passage is 700 yards westward of Elrington Passage Light between two islands westward of Bettles Island; a buoy marks a reef 1,100 yards northwestward of Elrington Passage Light which uncovers 3 feet.

A reef covered 5 fathoms, is in the northern approach, 1.8 miles eastward of Sawmill Bay Light.

**The March 1964 earthquake caused a bottom uplift of 6.8 feet in Sawmill Bay.** Shouling and new dangers may exist requiring extreme caution until a complete survey is made of the area.

**Johnson Cove**, on the north side of Sawmill Bay entrance, has an abandoned saltery at its head. The cove is foul with 8 feet in the basin at its head.

**Bettles Island**, the largest of the high wooded islands at the entrance to Sawmill Bay, has foul ground along the north shore.

**Crab Bay** is a small indentation on the northern shore of Sawmill Bay. A saltery just inside the western entrance point has a wharf with a face 142 feet long and 27 feet alongside. Large vessels make port dockings, the dock heading being  $333^{\circ}$ . Fresh water is available and fuel oil is stored for cannery use. A short distance off the wharf is a reef with a least known depth of  $2\frac{1}{2}$  fathoms. The reef is marked by a buoy at its southwestern end. Vessels should make a port landing and back out into Sawmill Bay when leaving the wharf.

**Port Benney** was formerly the site of a saltery just west of Crab Bay.

**Port Ashton (P.O.)** is on the northwestern shore of Sawmill Bay. A saltery has a wharf with a least depth of 29 feet, and an oil wharf has 20 feet at its southwest corner and 30 feet at the southeast corner. Diesel fuel, gasoline, and lubricating oils are available. Port Ashton also has a cannery and wharf with a 104-foot face with 27 feet alongside. Large vessels make port dockings, the dock heading being  $051^{\circ}$ . Radiotelephone and radiotelegraph

communications are maintained with the Alaska Communication System. A group of rocks, awash at extreme low water 115 yards offshore and about 260 yards north-eastward from the wharves, is marked by a buoy.

**Port San Juan (San Juan)** is at the southwestern end of Sawmill Bay. The San Juan Fishing and Packing Company has radiotelephone and radiotelegraph service with the Alaska Communication System. The wharf has a least depth of about 30 feet. Fresh water is available.

A rock covered  $1\frac{1}{2}$  fathoms, is 700 yards eastward from the wharf; a buoy is 100 yards northward from it. Another rock, covered  $2\frac{1}{4}$  fathoms, is 325 yards northeastward from the wharf and is marked by a buoy. In the approach to this wharf are some spots with less than 27 feet over them.

Careful maneuvering is required for a large vessel to get away from this wharf safely. The practice is to swing the stern out and back toward the island before turning.

The Port San Juan Cannery and Reduction Plant has a wharf with a face 200 feet long with 29 feet alongside. Large vessels make port dockings, the dock heading being  $354^{\circ}$ .

Sawmill Bay has no good anchorages. Vessels sometimes anchor between the oval-shaped island and the cannery, but the holding ground is poor.

Sawmill Bay can be entered by either the northeastern or the southwestern entrance. The former is recommended because of its greater width. In proceeding toward the southwestern end of the bay, vessels can pass on either side of the small oval-shaped island in the middle of the bay. If passing on the northern side, the island should be favored to avoid the rocks off Port Ashton.

**Tides and currents.**—The diurnal range of tide in Sawmill Bay is 11.3 feet. Little or no current exists in the bay.

**Prince of Wales Passage**, between **Evans** and **Bainbridge Islands**, is between 10 and 11 miles long and from 0.5 to 2 miles wide. It offers a direct route from Knight Island Passage for vessels bound southwestward along the coast; otherwise Elrington Passage is more direct and is generally used.

Prince of Wales Passage has several dangers. The principal channel at the northern entrance is eastward of Flemming Island and the  $2\frac{1}{2}$ -fathom shoal about 0.5 mile south of the island, then westward of Iktua Rocks. From the prominent point on Bainbridge Island about 2.7 miles southward of Flemming Island, a foul area with a depth of 8 fathoms lies about 0.3 mile to southward and 500 yards offshore. Pass 1,000 yards offshore to avoid the foul area, then follow off Bainbridge Island at a distance of 500 yards, pass the broken ground about 4 miles southward of Flemming Island and head for **Amerk Point**, the prominent low sand point with a fringe of trees, 3 miles farther southward on Bainbridge Island.

The channel westward of **Flemming Island** has considerable foul ground and should be avoided by strangers, except possibly small craft proceeding with caution and preferably at low water. Good anchorage in 4 to 16

fathoms, mud bottom, is west of the south end of Flemming Island at **Panhat Point** on Bainbridge Island. To enter the anchorage area from the south, pass 300 yards off the point on the north course until 500 yards north of the point, head west and then south to anchorage.

**Gage Island**, wooded and with a group of partly bare rocks off its south side, is 0.5 mile northward of Flemming Island and is a good mark for the north entrance of Prince of Wales Passage.

**Ship Islet**, with a few trees, is the southerly of two on the east side of Flemming Island. A reef bare at low water extends 225 yards southeastward.

**Iktua Bay** opens to the north on the east side of the passage about 1.5 miles south of Flemming Island. The bay is about 0.6 mile wide at the entrance and narrows to about 0.4 mile midway of its 1.5 miles southerly extent. The eastern shore of the bay has few off-lying dangers and may be followed 200 to 300 yards offshore to the head of the bay and anchorage in 3 to 14 fathoms, mud bottom. The west shore of the bay may be followed about 200 yards off for 0.7 mile until abeam of the southerly of two small islets. Good anchorage for small craft in 2 to 10 fathoms, mud bottom, is eastward of these islets.

**Iktua Rocks**, a group of bare rocks, highest about 3 feet, are 0.4 to 0.5 mile off Evans Island and 1.5 miles south of Flemming Island.

**Gugak Bay** is on the eastern side of the passage about 1.3 miles south of Iktua Rocks. A rock that bares at half tide marks the west side of the narrow entrance. The entrance channel has a depth of  $1\frac{1}{2}$  fathoms, and the bay is a secure anchorage for small craft in 3 to 8 fathoms, mud bottom. There is anchorage in 6 to 13 fathoms outside the bay entrance.

Several wooded islands are on the east side of the passage from 3.2 to 5 miles southward of Flemming Island. The area between them and Evans Island is foul and the tidal currents have a velocity of 2 to 3 knots. Nearly in midchannel westward of the middle island is an area of broken ground nearly 0.7 mile long on which the least depth found is 5 fathoms. It should be avoided by vessels, the better channel following the western shore. The broken area with depths less than 3 fathoms, 1 mile farther southward and extending 0.3 mile from the western shore, should be avoided.

The only good anchorage in Prince of Wales Passage is in circular **Squirrel Bay**, at the southwest point of Evans Island. Anchorage can be found near the center of the bay in 12 to 22 fathoms, sand and gravel bottom of fair holding qualities.

Glacial ice is sometimes discharged through Prince of Wales Passage.

**Currents**.—Off Amerk Point at the narrowest part of the passage, the flood sets north at a velocity of 0.8 knot and ebbs southwestward at a velocity of 2.5 knots. Between Flemming and Evans Islands at the north end of the passage the velocity is from 1.5 to 2 knots.

**Charts 8551, 8515, 8517**.—**Knight Island Passage**, on the west and south sides of Knight Island, is used by vessels calling at Drier Bay and other bays on the west

side of Knight Island. With easterly winds it offers a smoother channel from Latouche Passage to the northern end of the Naked Island group than the generally used route eastward of Knight Island.

From its northern entrance between Herring Point and Crafton Island, where it is 5 miles wide, the passage extends 16 miles in a southerly direction to Pleiades Islands, with a least width of 2 miles at the southeast end of Chenega Island. The channel leads eastward of the Pleiades, where it is 1.2 miles wide between them and Point of Rocks. From these islands the passage has a southeasterly trend for 10 miles, with widths of 3 to 4 miles, to Montague Strait between Point Helen and the north end of Latouche Island.

The depths in the passage range from 40 to 400 fathoms. The west side is generally bold, with exception of the bight between Crafton Island and Point Nowell. From Lower Herring Bay to Pleiades Islands, the eastern shore is foul for 0.8 mile off, with islands, rocks, and reefs. The bays on the west side of Knight Island are not good anchorages. Small craft can anchor in nearly all the arms of the bays, but the bottom is generally rocky.

**Pleiades Islands**, in the middle of the bend in Knight Island Passage, are a chain of seven wooded islands 1 mile long. The southernmost and largest is about 90 feet high. The rock, about 400 yards westward of the middle of the chain, bares at low water. **Pleiades Light** ( $60^{\circ}14.4' N.$ ,  $148^{\circ}00.5' W.$ ), 30 feet above the water, is shown from a small white house on the northern end of the northernmost island of the group.

**Ice**.—Considerable glacial ice has been seen in the passage south of Pleiades Islands. It comes eastward between Point Countess and Chenega Island, and drifts as far as Latouche Passage with the ebb.

The tidal currents in Knight Island Passage have a velocity of 1 to 2 knots.

**Chart 8523**.—**Little Bay**, on the south side of Knight Island, 1.8 miles westward of Point Helen, is clear so far as known. The depths are 13 to 18 fathoms, rocky bottom, and it is a fair anchorage except with southerly winds.

**Mummy Bay**, in the south end of Knight Island, is deep and clear, but rocks extend 0.3 mile from the head. Small vessels can anchor 0.5 mile from the head in 15 to 20 fathoms. **Northeast Arm** is an anchorage for small craft.

**Thumb Bay** is a small inlet opening into the southern part of Mummy Bay. The saltery wharf on the south side of the bay has a face 221 feet long but only 200 feet of it can be used by a large vessel. A submerged rock is just off the face of the wharf and 210 feet from its corner. The controlling depth at the face is 20 feet. A large vessel lies port-side-to, with the bow near the submerged rock in 13 feet. Diesel oil and fuel oil are stored for saltery use. Fresh water can be obtained during the summer while the plant is in operation. The bay affords anchorage for small vessels in 12 to 15 fathoms. The point on the south side of the entrance is marked by a light, 20 feet above the water, and shown from a small white house.

**Lucky Bay** and **Italian Bay** are unimportant inlets on

the south shore of Knight Island between Long Channel and Mummy Bay.

**Chart 8524.**—Squire Island and Mummy Island, two large islands on the east side of Knight Island Passage, are separated from Knight Island by Long Channel. Squire Island, the southern one, is the higher of the two. A drying ledge is 0.3 mile southwestward from Squire Point, the south end of the island. Two small islands are 0.3 mile off the west side of Squire Island, and from these islands a large reef extends 0.4 mile westward to Point of Rocks, the latter awash at high water. The channel between Mummy and Squire Islands leading into Long Channel has rocky, broken bottom, and should be used with caution.

**Long Channel** is a deep inside passage for small craft from Drier Bay to the southern part of Knight Island Passage. It is 4.5 miles long and the midchannel is clear so far as known. The channel is generally 0.3 to 0.4 mile wide, but narrows to 175 yards abreast Mummy Island and to 50 yards 0.8 mile from the north end of Squire Island. A rock, covered at high water, lies in the northern entrance 0.3 mile eastward from the north end of Mummy Island. The tidal currents have little velocity.

**Copper Bay**, on the east side of Long Channel, is abreast the north end of Squire Island. Its entrance is very narrow and foul, and suitable only for small craft with local knowledge. The tidal currents have considerable velocity in the entrance.

**Mummy Island**, on the south side of the entrance to Drier Bay, is high, and wooded; on the southern half of the island are patches of grass. Reefs extend 0.3 mile southwestward from the north end of the island, and wooded islets with reefs around them extend 0.6 mile westward from the middle of the island.

**New Year Islands** are on the northern side of the approach to Drier Bay. They are wooded, and the largest is 200 feet high. A light, 20 feet above the water, shown from a small white house, is on the most southerly timbered island of the group. Bare reefs extend 250 yards southwestward from the light. Rocks that uncover are 500 yards 019° from the north island, and are a serious danger in the channel between New Year Islands and the islands northward.

**Drier Bay** has its main approach between New Year Islands and Mummy Island. The southeast shore of the bay is indented by a number of smaller bays and coves. Drier Bay has been examined from the 50-fathom curve at the entrance to the head of the northern arm and found to be clear of dangers except those charted.

Strangers may have some difficulty in recognizing the entrance to Drier Bay, as there are several groups of islands on the east side of Knight Island Passage, both north and south of the entrance. Approaching from northward, the island in the mouth of Johnson Bay is a good mark. The chart is the guide.

**Clam Islands**, two in number, low and wooded, are between New Year Islands and Rocky Point, the north point of Drier Bay. A rocky patch with 3½ fathoms over

it lies 0.3 mile southward from Clam Islands, about in the middle of the entrance.

**Range Isle**, small and wooded, is close to the north side of Drier Bay and 2 miles eastward of New Year Islands. The line of Range Isle just clear of the north shore eastward of it, leads about midway between Mummy Island and New Year Islands, and is sometimes used as a range for entering the bay.

**Cathead Bay** is on the south side of Drier Bay, 2 miles from Mummy Island. Two Islands are in the upper part of the bay. The soundings taken indicate deep water, but it has not been thoroughly surveyed. In the entrance of the bay, 0.1 mile from the west side, is a rock with ¾ fathom over it.

**Cathead Shoal**, with a least known depth of 3½ fathoms, is about 500 yards northeastward from Cat Head, the point on the west side of Cathead Bay entrance. When entering Cathead Bay, favor the east side to avoid Cathead Shoal and the ¾-fathom rock, then proceed with caution on either side of the islands at its head.

**Mallard Bay**, on the south side 2.5 miles inside Mummy Island, is foul for a distance of 0.2 mile from its head. Approaching with care, anchorage can be made 0.4 to 0.5 mile from the head in 17 to 20 fathoms.

**Barnes Cove** is obstructed by ledges at its entrance, and shoals make out from the shores. Small craft entering with care can find good anchorage in 8 fathoms. Vessels can anchor 300 to 500 yards off the entrance in 20 to 22 fathoms.

The point on the northeast side of Barnes Cove is prominent and high, with bare rocky sides. A reef extends 150 yards off the northwest side of this point.

**Chase Island**, small and wooded, is 700 yards from the northwest side of Drier Bay and 1.8 miles east of Range Isle. A ledge which bares, extends 300 yards southward from Chase Island.

A rock awash at half tide is 0.4 mile northeastward of Chase Island. Another rock bares at lowest tide between the half-tide rock and Mountain Point.

**Port Audrey** is the northern arm of Drier Bay. A rock covered 1¾ fathoms is about 500 yards south of the entrance to the lagoon at the head of the arm. The lagoon has depths of 7 feet in the entrance and good anchorage inside for small craft in 6 to 10 fathoms. A flat extends out 250 yards from the head of the lagoon. Violent winds blow in and out of Port Audrey.

**Northeast Cove**, at the head of Drier Bay, is small and has shoals at its entrance and also inside for 0.1 mile from its head. Small craft entering with care can find good anchorage in 4 to 5 fathoms. Vessels can anchor 300 to 500 yards off the entrance in 17 to 20 fathoms. A rock with 2¾ fathoms over it is about 300 yards offshore, 500 yards westward from the entrance. Anchorage can be selected about 0.3 mile from shore in the north end of Drier Bay, in about 20 fathoms.

**Squirrel Island**, 9.5 miles southward of Herring Point and 0.5 mile from the eastern shore, is the northernmost of the islands extending 1.5 miles northward of the entrance to Drier Bay. It is high and wooded.

**Johnson Bay** is suitable only for small craft; strangers should enter at low water only, and proceed with caution in the vicinity of all broken ground. A wooded island is in the mouth of the bay. The entrance, northward of the island, is about 125 yards wide between reefs which are bare. The axis of the channel is about 125 yards from the north shore. From Knight Island Passage, a course for the north point at the entrance in range with a pyramidal peak of black rock 2,090 feet high, above the head of the bay, will lead between the outlying dangers to the entrance. Water can be obtained from a fall near the head.

A covered rock, dangerous for small craft, is 0.1 mile southward of Aguliak Island.

**Charts 8515, 8517.**—**Channel Rock**, a prominent, bare, black rock about 6 feet high, lies nearly 1 mile off the entrance of Lower Herring Bay, and is a good mark for Knight Island Passage. A rock which uncovers is 1.4 miles 025° from Channel Rock and 0.6 mile from the shore of Knight Island. From this rock southward the eastern side of Knight Island Passage is very broken and foul, with deep water extending close to the dangers.

**Lower Herring Bay** is suitable only for small craft. The best entrance is eastward of Channel Rock. The principal danger in the bay is a rock that uncovers 9 feet which lies in the middle, 600 yards from the eastern end of the bay. The passage between this rock and the point northward, between the two arms, should be used with caution. A midchannel course should be followed in the arms. Small craft can anchor in the cove on the south side 1.2 miles inside the entrance of the bay, in not less than about 10 fathoms. Water can be obtained in this cove from a fall.

A narrow deep passage, suitable for small craft, follows the shore inside the islands between Lower Herring and Johnson Bays. Strangers should take it at low water and exercise care.

**Chenega Island** has a bold but fairly regular shore bordering on Knight Island Passage. Its highest summit is near the center. The south shore of Chenega Island is indented by several small bays where small vessels can find anchorage and shelter from the prevailing northeast storms.

The March 1964 earthquake caused a bottom uplift of 5.2 feet at Chenega Island. Shoaling and new dangers may exist requiring extreme caution until a complete survey is made of the area.

**Chenega** (1900 population 61; P.O.) is at the head of a cove indenting the south end of the island, which is marked by three small wooded islets. A rock bares 4 feet 150 yards north of the northernmost islet. A school and church are located in the village, but practically no supplies are available. There is a prominent landslide back of the village.

Small vessels can anchor in the cove fronting Chenega, in 5 to 15 fathoms, soft bottom. The anchorage is only partly protected from the south by the entrance islets and is not recommended in southerly weather. To enter, pass

300 yards west of the entrance islets on a 000° course until within 300 yards of the shore, then swing sharply to the right and head for the cross on the church, a white, green-roofed structure. Anchor in a suitable depth.

**Whale Bay**, indenting the mainland, is 4 miles westward of Bainbridge Point. A low portage at the head of the western arm connects with the head of Port Bainbridge. The bay is deep, but small craft can find anchorage along the eastern shore of the south arm and in 6 to 10 fathoms, mud bottom, in the small hight in the north side of the western arm; the latter is a very good anchorage and is directly off a bare cliff that is visible for some distance. Ice from Icy Bay often obstructs the entrance to Whale Bay.

**Dangerous Passage** separates Chenega Island from the mainland. The northern entrance of the passage is obstructed for a distance of about 0.6 mile off the north end of Chenega Island by a group of islets and rocks, including **Junction Island**, which is high and wooded. The northernmost obstruction of the group is a rock awash at low water. It is difficult to pick up the northern entrance at night.

About 5.5 miles from the northern entrance, **Dangerous Passage** is restricted by a group of islets. **Delenia Islet**, the largest, is in the middle of the passage and is wooded. A small grassy islet is 350 yards northward of Delenia Islet; a 3½-fathom shoal is 450 yards north of the grassy islet. The deepest and straightest channel is between this shoal and the nearby western shore of Dangerous Passage, and is 225 yards wide. The channel to the eastward and southward of Delenia Islet is wider, but a rock, bare only at lowest tides, must be avoided. The rock is 250 yards eastward from the grassy islet.

The best anchorage in Dangerous Passage is in the vicinity of Delenia Islet. There is good holding ground about 0.3 mile southwestward of the islet in 15 to 20 fathoms.

**Granite Bay** is on the north side of the northern entrance to Dangerous Passage. Depths are irregular and not recommended for anchorage.

**Paddy Bay** is about 3 miles southwestward of Granite Bay. A rock awash at low water, is 330 yards west of the southern end of the island near the head of the bay, and near the middle of the entrance to the northwestern arm. The bay affords anchorage for moderate-sized vessels in either of the two arms at the head.

**Masked Bay** indents the Chenega Island shore of Dangerous Passage opposite Paddy Bay. The wooded islets in the entrance leave a channel only 100 yards wide. Small vessels will find excellent anchorage in the bay, but local knowledge is required for entering.

**Ewan Bay** indents the north shore of Dangerous Passage about 5 miles from the north entrance. Several rocks and islets fringe both shores of the bay, but mid-channel is deep and clear. The entrance to the lagoon at the head of the bay is obstructed by rapids. Small vessels can anchor at the head of the bay, but it is rather deep.

**Jackpot Bay** is about 3 miles southward of Ewan Bay. **Jackpot Island**, wooded, is near the middle of the entrance. The narrows, 1.5 miles above the entrance, have a width of 250 yards. At the upper end of the narrows, a mid-channel rock uncovers 8 feet. This rock is on range with the eastern tangent of the narrows and the highest point of Jackpot Island. Depths in the bay are generally too deep for anchoring. Small craft can find good all-weather anchorage in either of the two basins in the northern part of the bay; the entrances are narrow but free of dangers.

**Charts 8551, 8515.**—**Icy Bay** is at the southwestern extremity of Dangerous Passage. It is separated from Port Bainbridge by a narrow neck of land of moderate height. **Verdant Island**, a precipitous, high, wooded island is off the east entrance point. Active glaciers in **Nassau Fiord** and at the head of Icy Bay keep the bay filled with ice most of the time, and make it dangerous for small boats to enter. Anchorage and good shelter from ice can be found in the bight on the west shore of Icy Bay, 0.8 mile northward of the entrance to **Nassau Fiord**.

**Ice.**—All the bays in this vicinity are likely to freeze over in cold weather. The ice flows from Icy Bay at times make navigation difficult west of the Pleiades Islands and extend northward into Dangerous Passage. The discharge is continuous but irregular in volume, and is mainly southeastward. When heavy it blocks the entrance to **Whale Bay** and passes southward of the Pleiades Islands. Isolated bergs of considerable size frequently drift eastward as far as **Latouche** and are a menace to navigation. Ice floes have been known to pass southward through **Bainbridge Passage** and then northward into **Prince of Wales Passage**. No ice has been observed east of **Delenia Island**.

**Chart 8528.**—**Procession Rocks**, 4.3 miles north of **Point Ellington Light**, are a group of jagged rocks, the highest rising to about 70 feet. There are four principal rocks, with a number of smaller rocks and reefs surrounding them. Deep water extends close up to the rocks.

**Port Bainbridge** is a deep body of water extending about 12 miles northward from a line joining **Cape Puget** and **Procession Rocks**. Depths of over 100 fathoms are carried nearly to the head of the bay.

**Point Pyke**, the eastern entrance point to **Port Bainbridge**, is a prominent headland rising almost vertically.

At the head of **Port Bainbridge**, the western arm extends nearly 1.5 miles to the northward. The water in this arm is deep, but the entrance is blocked by a gravel bar with a least depth of about  $1\frac{1}{2}$  fathoms. The best water is close to the eastern entrance point.

**Bainbridge Glacier**, nearly 1 mile wide, discharges into **Port Bainbridge** opposite **Bainbridge Passage**.

**Auk Bay**, on the western side of **Port Bainbridge**, opposite **Point Pyke**, is small but affords good anchorage in 20 fathoms, muddy bottom. A rock that uncovers is about 150 yards off the northern shore, 1 mile inside the

entrance. The southern entrance point is marked by a prominent pinnacle rock.

A prominent brown rock about 10 feet high is 0.3 mile offshore, 2.5 miles northward of **Cape Puget**.

**Chart 8523.**—**Swanson Bay**, a long narrow bay lying just north of **Point Pyke** and extending 3.5 miles to the eastward is deep, but no good anchorages are available. Indifferent anchorage can be found near the head of the bay in 28 to 30 fathoms, mud bottom.

**Hogg Bay**, about 2 miles northward from **Point Pyke**, is the largest bay in **Port Bainbridge**. It is free from dangers except for a rock that uncovers 3 feet, 0.2 mile off the northern shore about 1 mile inside the entrance, and a rock awash at low water 180 yards off the south shore, 1.7 miles from **Swanson Point**.

Fair anchorage can be had near the head of the bay at the entrance of the northern arm, in 25 fathoms, hard bottom, with patches of sand and gravel. Small craft can find excellent shelter at the head of the northern arm. A beach suitable for beaching small craft is behind the northern island near the entrance to the north arm.

**Charts 8551, 8515, 8528.**—**Bainbridge Passage**, between **Bainbridge Island** and the mainland, extends northeastward for 10 miles from **Port Bainbridge** to **Knight Island Passage**. **Bold Point Waters**, 5 miles northward of **Point Pyke**, is on the mainland side of the entrance from **Port Bainbridge**. **Bainbridge Passage** is used extensively by fishing craft.

There are two outlying dangers in the passage. A ledge that uncovers 3 feet is about 200 yards off the point about 3 miles southward of **Point Countess**, the northwest point at the eastern entrance to **Bainbridge Passage**. Another ledge that uncovers 4 feet is about 250 yards off the north shore, 1.8 miles eastward of **Point Waters**, the northwest point at the western entrance to the passage. Although there is deep water between both these ledges and the north shore, vessels should pass southward of them.

A recommended anchorage in the passage is in the small bay about 2.2 miles southward of **Point Countess**. Care should be taken however to avoid the rock that uncovers 6 feet in the middle of the bay and the ledge that extends off the northeastern entrance point.

The tidal current in **Bainbridge Passage** floods northeastward at a velocity of 3.1 knots and ebbs southwestward at 2.4 knots.

**Chart 8528.**—The coast between **Cape Puget** and **Cape Resurrection** is high and rugged, with numerous glaciers showing in the valleys. No shelter is available except in **Day Harbor**, where the anchorage is very good. The coast is clear except for a few rocks extending not more than 0.3 mile offshore. The first range of mountains varies about 2,000 to 3,500 feet in height, while the back range is about 5,000 feet high. Much of the hinterland is covered by an ice cap.

A constant current sets southwestward along the **Kenai**

Peninsula. See remarks on currents in chapter 3.

**Cape Puget** is a prominent headland with an eroded bluff. At the foot of the slope is a conical rock which is prominent from an east or west direction. Several bare rocks are off the cape, the farthest being about 0.2 mile.

**Puget Bay**, the first indentation westward of Cape Puget, is funnel shaped and extends northward for about 6 miles. The bay is deep throughout and free from dangers except for rocks and reefs close inshore.

**Goat Harbor** is an inlet on the eastern side of the bay about 4 miles from Cape Puget. It affords good anchorage in 12 to 14 fathoms, sticky mud bottom, but is exposed to the swell from the southwest. A gravel and shingle bar with a least known depth of  $5\frac{1}{2}$  fathoms extends across the entrance. A rock awash is 0.2 mile west of the small islet off the northern entrance point. Near the head of Puget Bay, and on the eastern side, is a small cove which affords shelter for small craft. A rock awash is about 100 yards off the southern entrance point.

**Cape Junken** is a bold, rounding headland with eroded bluffs and landslides. At the foot of Cape Junken are two steps which show up prominently from alongshore. In thick weather this feature is valuable in identifying the cape.

**Johnstone Bay** is a large open bight west of Cape Junken. Across the head of the bay is a black sand beach. Deep water extends close up, there being 50 fathoms within 0.5 mile of the beach. **Excelsior Glacier** terminates in Johnstone Bay and drains through a stream at the eastern end of the sand beach. A small cove with a shingle beach is at the eastern entrance to the bay, but it is wide open to the southwest and affords little shelter. A black rock, 35 feet high, marks the western entrance, and there is a low rock nearly awash at the eastern entrance.

**Cape Fairfield** is a bold, rounding cape with eroded bluffs and many rockslides. A large pinnacle rock, 126 feet high, is off the southeast pitch of the cape. The bow of the wrecked steamer YUKON lies on the beach of the cove just westward of the pinnacle. The wreck is visible for a distance of 2 miles offshore.

**Whidbey Bay** is a large open bight just westward of Cape Fairfield. A black sand beach is at the head of the bay. About 3 miles up the valley is a prominent hanging glacier.

Depths shoal to 12 fathoms about 1 mile from the sand beach, and anchorage can be had in black sand and glacial silt. Both sides of the bay are foul, with numerous rocks and reefs extending 100 to 200 yards off the rocky beaches. A stream enters at the west end of the sand beach.

**Cape Mansfield** is bold, with high eroded bluffs and rockslides. A small pinnacle rock awash at high water is about 0.3 mile off the cape. Deep water is close up to this rock.

Just westward of Cape Mansfield is a small cove with a sand beach at its head. Except for this sand beach, the shore between Cape Mansfield and Day Harbor is

rugged, with high bluffs and rockslides. There are numerous rocks at the foot of the bluffs and a short distance offshore.

**Day Harbor**, a spacious body of water just eastward of Resurrection Bay, is free from dangers except close inshore. Deep water extends to the head of the bay, which is formed by the moraine of **Ellsworth Glacier**. This glacier shows up prominently when entering the bay.

**Fault Point**, the eastern entrance point to Day Harbor, terminates in a narrow point showing several remarkable faults in the rock formation.

**Anchor Cove**, about 2 miles northward from Fault Point, is a small cove affording excellent shelter for small craft. A short distance off the eastern shore of the cove near its head is a reef awash at high water. The shores are heavily wooded.

**Bowen Anchorage**, which affords the best anchorage in Day Harbor, is 4 miles northward from Fault Point. It is about 500 yards wide at the entrance, and narrows gradually to the head of the cove. Anchorage can be had in the center in 15 fathoms, sticky mud bottom. In the entrance is a small reef cleared to  $25\frac{1}{2}$  feet. Bowen Anchorage is suitable for a vessel up to about 400 feet in length.

Deep water extends close up to the head of Day Harbor, the 50-fathom curve being only about 350 yards offshore. A flat in the northwest corner of the bay, northwest of Bowen Anchorage, affords anchorage 0.4 mile offshore in 15 to 18 fathoms.

**Talus Bay** is a small cove on the west shore of Day Harbor, affording anchorage in 10 to 15 fathoms, but it is exposed to the southeast. A rock bare at low water is about 100 yards off the eastern entrance point.

**Safety Cove** is a small deep cove about 1 mile south of Talus Bay. Anchorage can be had in the center of the cove in 25 to 30 fathoms.

**Killer Bay**, a small cove about 2 miles south of Safety Cove, is too deep for convenient anchorage, with 32 to 39 fathoms in the middle of the bay. A rock, 15 feet high, is about 100 yards off the southern entrance point.

**Driftwood Bay** is about 3 miles northward from Cape Resurrection. It is about 0.5 mile wide at the entrance and is free from dangers. Anchorage can be had in the middle of the bay in 25 to 30 fathoms, hard bottom. Small craft will find excellent shelter in a bight in the south shore of the bay.

**Chart 8529.—Cape Resurrection**, at the eastern entrance to Resurrection Bay, is a precipitous headland of solid rock, with little vegetation except some trees on the lower slopes. From the eastward two dome-shaped peaks, the north one the higher, show at the end of the cape, and a low saddleback of the peaks rises to higher mountains farther north. These are the only dome-shaped peaks in the vicinity, which assures easy recognition of the cape.

**Barwell Island**, 0.4 mile southward from Cape Resurrection, is small, bare, rounded, precipitous, and high.

The passage between Barwell Island and Cape Resur-

rection is deep and clear, midchannel depths ranging from 45 to 48 fathoms.

**Resurrection Bay** extends about 16 miles inland north from Cape Resurrection. The depths are great throughout, and there are no dangers in the usual track of vessels. A flat extends 0.5 to 0.6 mile from the entire northern shore at the head of the bay. The shores and islands are steep and high, with precipitous slopes in many places. The valleys are wooded up to about 1,000 feet. Anchorages are few and indifferent on account of the great depths, and are subject to strong williwaws.

**Harding Gateway**, the southern entrance to Resurrection Bay, is between Cheval and Rugged Islands.

**Seal Rocks**, the southernmost land feature in the western approach to the bay, are a group of four small, rocky islets. The northernmost and largest is 278 feet high and has an arch through the middle. **Seal Rocks Light** ( $59^{\circ}31.3' \text{ N.}$ ,  $149^{\circ}37.7' \text{ W.}$ ), 285 feet above the water, is shown from a small white house on the summit of the largest islet.

**Lone Rock** stands well southwestward of Chiswell Islands and is a good mark. It is a round rock, 154 feet high, and has a rock covered at high water, about 0.1 mile northward of it. The passage between Seal Rocks and Lone Rock is clear and is frequently used by vessels between Resurrection Bay and the coast southwestward.

**Chiswell Islands**, a group of high precipitous, rocky islands, on the west side of the approach to Resurrection Bay, are sparsely wooded, most have off-lying rocks, and there are strong tidal currents between them.

**Pilot Rock**, 9.5 miles southwestward of Cape Resurrection, is a bare, rounded, rocky islet about 100 feet high. It is marked by a light shown from a small white house on the highest part of the rock.

**Agnes Cove**, just westward of Cheval Island, is sheltered from the southeast, but is too deep for convenient anchorage.

**Porcupine Cove**, about 4 miles southward from Bear Glacier, offers a good anchorage for small craft in all except southeasterly weather. At the head of the cove is a gray sand beach with stumps below the high-water line which indicates that there has been a subsidence of the beach. A detached rock about 30 feet high is 200 yards off the western shore.

**Bulldog Cove**, the first cove southward from Bear Glacier, affords a good anchorage for small craft in southwesterly weather. In northerly weather it is exposed to winds sweeping off the glacier. The best anchorage is in the southern bight in about 10 fathoms, sticky mud bottom.

**Bear Glacier**, large and prominent, is on the western shore westward of Cape Resurrection. It is inactive, and has an earthy appearance.

Toward the eastern shore in the entrance of Resurrection Bay are three large, high, rugged islands, named in order from southward Rugged, Hive, and Renard. The passages between the islands are deep. Their shores are generally bold, but two rocks bare at low water are about 200 yards off the southeast end of Renard Island. A

light, 80 feet above the water, is shown from a small red house on the northeast side of **Hive Island**.

The large cove indenting the southern shore of **Rugged Island** affords fair anchorage in easterly weather. Anchor in the easterly cove with Pilot Rock about on range with the southern entrance point. A light, 438 feet above the water, is shown from a small white house on the southeastern end of the island.

**Sunny Cove**, the southern bight on the west side of **Renard Island**, is the best anchorage in Resurrection Bay. No ocean swell makes into the cove, and it is sheltered from all but westerly winds. The williwaws are bad with easterly winds. The cove is wide and clear. The anchorage is in the middle, 300 to 800 yards from its head, in 15 to 25 fathoms, muddy bottom.

Small craft can also anchor in the southeast arm of the two-arm bay on the eastern shore 1.5 miles northward of Renard Island. In the winter this bay affords better protection than Sunny Cove, which is bad for small craft in northwesterly weather. The anchorage is in 7 to 8 fathoms, sandy bottom. The narrow bight extending eastward is filled with a sandflat which bares at low water.

**Thumb Cove**, on the eastern shore northeastward from **Caines Head**, is 0.8 mile wide. Anchorage can be selected 0.4 to 0.5 mile from its head in 25 to 30 fathoms, soft bottom. A flat makes out 200 to 300 yards from the northern shore for a distance of 0.4 mile from its head. The point on the north side of the entrance is marked by a light. **Caines Head** is marked by a light.

**Seward** (1960 population 1,891; P.O.) is on the west side of the north end of Resurrection Bay. The town is the southern terminus of the Government-owned Alaska Railroad. Seward is 1,234 miles from Seattle via the outside route from Strait of Juan de Fuca, and 1,398 miles via the inside passage to Cape Spencer.

The March 1964 earthquake caused a bottom subsidence of 3.5 feet at Seward. Until a complete survey is made of the area, caution is necessary because depths may vary from those charted and mentioned in the Coast Pilot.

**Prominent features.**—Cape Resurrection, Bear Glacier, and the mountains that rise precipitously from the shores of the bay are conspicuous in the approaches and the wharves and a white schoolhouse at Seward stand out.

**Channel.**—The approach to Seward is in depths of over 50 fathoms and is clear of obstructions.

**Anchorages.**—Suitable anchorage in 30 fathoms is available for deep-draft vessels at the head of the bay in  $60^{\circ}06.5' \text{ N.}$ ,  $149^{\circ}23.8' \text{ W.}$ , southward of a marker buoy.

**Dangers.**—The bay is clear but care should be taken when approaching the head of the bay to avoid the flats which extend 0.6 mile from the head.

**Tides.**—The diurnal range of tide is 10.6 feet at Seward.

**Weather.**—Winter gales strike suddenly and considerable sea makes into the bay with southerly winds. At Seward the prevailing wind is from the south from April to September and north during the remainder of the



year. The high mountain ranges give some protection, but the region is subject to violent williwaws. The annual snowfall averages 78 inches at Seward.

**Routes.**—Eastward: From the entrance point, 0.6 mile south-southwestward of Barwell Island, set courses to pass 0.6 mile west of the southwestern part of Renard Island, 0.5 mile east of Caines Head Light, and thence to the waterfront at Seward.

Westward: From the entrance point, 1 mile east of Pilot Rock, set courses to pass 2.5 miles west of the southern extremity of Rugged Island, 0.5 mile east of Caines Head Light, and thence to Seward.

**Pilotage** is not compulsory but advisable. Vessels can obtain a pilot before leaving Seattle, or from Ketchikan, Juneau, or Anchorage on a week or ten days' prior notice.

**Quarantine.**—Vessels subject to quarantine calling at Seward should notify the quarantine office at Anchorage of their expected time of arrival. There is an outpatient office of the U.S. Public Health Service at Seward General Hospital.

**Customs and Immigration** are handled by Anchorage officials, however, at times an employee of the Alaska Railroad at Seward may be designated to perform such functions.

**Wharves.**—The entire waterfront at Seward, including piers, docks, and small-boat basin were destroyed by the March 1904 earthquake, with the exception of about 200 feet of docking space at the northern end of the Alaska Railroad wharf. A dolphin about 75 feet off the northern end of the wharf provides a 275-foot docking face. Depths alongside are about 35 to 40 feet. A concrete slab showing about 12 feet at low water is about 20 feet off the southwestern end of the wharf. Small boats can tieup temporarily in the knuckle at the south end of the Alaska Railroad wharf. A 45-ton gantry crane is available.

**Caution.**—Submerged ruins and obstructions may exist in an area 300 yards offshore extending 1 mile northward of the Alaska Railroad wharf; other dangers may exist farther offshore.

**Supplies.**—Some marine hardware is available and there are stores and a number of hotels. Gasoline, diesel fuel, and lubricating oil are available by truck for small craft only.

**Repairs.**—Small boat hull and engine repair facilities are available.

**Communications.**—The Alaska Railroad maintains service throughout the year from Seward to Anchorage and Fairbanks; large amounts of supplies and equipment bound for all parts of Northern Alaska are moved over the railroad. Passenger service is not available. The town is a year-round port of call for the regular coasting vessels from Seattle. Scheduled air service operates daily to Anchorage, and nonscheduled flights are made to other areas. Seward has highway connections with Anchorage and Fairbanks.

Seward has radio and cable communications with other Alaska ports and Seattle. Radiotelephone and radiotelegraph communications are maintained with the Alaska

Communication System. A commercial radio station, KIBH, broadcasts daily.

**Aialik Bay** extends 16 miles inland from the north end of Harbor Island. It is inclosed by rugged mountains and glaciers and is of no importance except occasionally as an anchorage. The shores are steep and high, with precipitous slopes in many places, and are partly wooded in the southern part of the bay to an elevation of about 1,000 feet. The northern shores are covered with alders in places.

Aialik Bay is deep except for rocks near the shores, and a bar which crosses the bay from the glacial flat fronting **Pederson Glacier**. The least depth found on the bar in midchannel is 18 feet, but it and the broken ground near the shores at the entrance of Holgate Arm are likely to have boulders and less water than charted. As a measure of caution vessels should avoid the passages among the islands in the mouth of the bay. To take advantage of smoother water, small vessels coasting southwestward from Resurrection Bay sometimes enter the bay at Aialik Cape, pass south of Chat Island, round the north end of Harbor Island, and pass out at Granite Cape.

**Chat Island** is a steep, high, rocky, and wooded island; two conspicuous pinnacles are close to its south shore. Between it and Aialik Cape are a smaller island and a number of rocks.

**Harbor Island** is the largest of a group of high, precipitous, rocky, and partly wooded islands in the mouth of the bay and northwest of Chiswell Islands. The shores in many places are sheer cliffs, especially the east shore of **Natoa Island**. Lying midway in the channel between **Beehive Island** and the small island at the southeast end of the Harbor Island group is a rock which is awash at lowest tides.

Small vessels proceeding along the coast use the pass locally known as **Petes Pass**, between Harbor Island and the first island to the east. A rock, awash at minus tides, has been reported in the narrowest part of this passage close eastward of the center. Vessels using this passage should favor Harbor Island when passing through this narrow opening.

**Granite Cape**, the southern end of Granite Island, is bold, with almost vertical rocky bluffs. Rocks awash at low water, lie a short distance off the cape. Between Granite Cape and the main shore are two small, high, wooded islands, with a rock about 10 feet high between them.

**Twin Islands**, in Dora Passage, resemble each other in contour and are high, and wooded. The arch off the south end of the northern island is conspicuous.

**Holgate Arm** is the largest indentation on the west side of Aialik Bay. The arm is too deep for anchorage and terminates in **Holgate Glacier**.

**Slate Island**, long, narrow, and high, is close to the west shore near the head of the bay. The head of Aialik Bay consists of sunken rocks and icebergs which are discharged from the glaciers feeding into the bay.

**Coleman Bay**, **Tooth Cove**, and **Bear Cove**, are bays on

the east side of Aialik Bay. None of them afford good anchorage.

**Anchorage.**—The anchorages in Aialik Bay are few and indifferent due to the great depth. With southerly weather a swell makes well into the bay.

The best anchorage is in 30 fathoms, good holding bottom, near the head of **Paradise Cove** in **Three Hole Bay**, on the east side of Aialik Bay about 3 miles north of Harbor Island. Small craft find good shelter along the southern shore of the cove in 3 to 10 fathoms, mud bottom.

Anchorage can be had in 28 fathoms near the center of the cove on the west side of the bay, westward of the north end of Harbor Island. On each side of the entrance to this cove is a sharp conical, high, wooded hill. Close inshore off the point at the north entrance is a sharp pinnacle rock about 12 feet high; about 600 yards northeastward of this pinnacle is **Hub Rock** which covers at about half tide.

Vessels can find convenient anchorage in the area about 1 mile southeast of the south end of Harbor Island. There is good shelter here with winds from north around to southeast.

**Ice.**—There are discharging glaciers at the heads of Aialik Bay and Holgate Arm, and ice is frequently driven to Harbor Island by northerly winds. Holgate Arm and the entire bay above the bar are frequently filled with ice.

**Harris Bay** is about 5 miles northwestward of the peninsula terminating in **Aligo Point**. The bay is deep throughout. The 50-fathom curve extends to within 0.5 mile of the head of the bay.

**Granite Island** is a high, long narrow island. Its shores are bold and its slopes are very steep except at the northern end.

**Tax Basin** is a remarkable cliff-walled harbor on the southwest side of Granite Island about 2 miles from its northwest end. It has depths of 18 to 20 fathoms and is an ideal shelter for launches. The entrance is narrow and has a rock 5 feet high in the middle. It is reported that vessels enter on the north side of the rock where there is a depth of about 2 fathoms. Once inside there is plenty of room. The channel south of the rock is shoal and foul with rocks nearly awash at low water.

**Granite Passage**, which leads from Aialik Bay to Harris Bay, is deep and free from dangers. At the narrowest part of the passage, just north of Fire Cove, a ridge with 6½ to 18 fathoms extends across the passage. The ridge affords convenient anchorage in any but heavy weather.

**Fire Cove** is the southernmost of three coves in the mainland opposite Granite Island. It is deep throughout and affords no satisfactory anchorage. The shores are precipitous and rocky.

**Ripple Cove**, the next cove to the northward, is also deep and affords no anchorage except in 28 to 30 fathoms, hard bottom. The third cove is also deep and not suitable as an anchorage.

**Crater Bay** is a large inlet about 1 mile northward from

the north end of Granite Island. A good anchorage will be found in the bight just eastward of the projecting point on the south shore, in 25 fathoms, sticky bottom. This anchorage is well protected but is subjected to severe williwaws. In the southerly cove at the head of Crater Bay is a stream where fresh water can be obtained.

**Cataract Cove**, just northward from Crater Bay, is another of the characteristic small deep bays of this region. It is exposed to the southwest, and is not recommended as an anchorage. Fresh water can be obtained from cascades at the head of the bay.

The northern part of Harris Bay is usually filled with ice discharged from **Northwestern Glacier**, which occupies the valley at the head of the bay. **Northwestern Lagoon** is at the northwestern corner of Harris Bay; shoal and foul, its entrance is blocked by rocks, bars, and usually by large cakes of ice.

**Harris Point**, a prominent point on the west side of the entrance to Harris Bay, is easily recognized by a succession of rocks and islets that extend 0.3 mile off. The outer rock of this group is 78 feet high.

**Cup Cove** is a small indentation just north of Harris Point. It has depths of 5 to 9 fathoms, mud bottom, and affords good anchorage for small craft except that it is exposed to easterly winds.

**Sandy Bay** is an indentation about 1 mile in extent between Harris Point and Two Arm Bay. The depths decrease gradually from 20 fathoms at the entrance to 3 fathoms at the head with sand bottom throughout. It is exposed to the southward and suitable for anchorage in fine weather only.

**Two Arm Bay** has Paguna Arm on the north and Taroka Arm on the west.

**Surok Point** is on the east side of the entrance to Two Arm Bay. It is bold and high, with deep water extending close up.

**Paguna Arm** is deep and affords no anchorage except at the very head, where vessels may anchor in 20 to 25 fathoms, hard bottom. There are several coves along the eastern shore where small craft can find anchorage close to the beach. The shores are steep and precipitous except for a small sandspit on the east shore near the head. There are numerous places in Paguna Arm where fresh water can be obtained.

**Bear Point** is a bold, high point separating Paguna and Taroka Arms. A group of rocks extend 100 yards off the point.

**Taroka Arm** is deep but affords anchorage near the head in 20 to 25 fathoms, hard bottom with occasional patches of sand and mud. Small craft can find shelter in several of the bights along the southern shore.

**Cloudy Cape**, on the south side of the entrance to Two Arm Bay, is bold and high. On the coast about midway between Cloudy Cape and Thunder Bay are lines of corrugated strata on two light-gray cliffs.

**Thunder Bay** is 2 miles wide at the entrance, and about 2.5 miles long with the upper end extending in an easterly direction. Safe anchorage for small craft can be had in the cove at the head of the bay in 10 to 20 fathoms, mud

bottom. Fresh water is available from several waterfalls at the head of the bay. A cup-shaped bight on the north side of the entrance to the bay affords anchorage in 12 fathoms, gray sand and rock bottom. A landslide is on the coast about 0.5 mile southwestward from Thunder Bay.

**Chart 8530.—Black Mountain** ( $59^{\circ}32.0' \text{ N.}, 150^{\circ}11.5' \text{ W.}$ ), the highest peak between Thunder and Black Bays, has a large granite boulder at its summit.

The point on the northern side of the entrance to **Black Bay** is marked by a 600-foot hill; reddish-brown tinted cliffs form the base on its seaward side. The island immediately adjacent to the point is wooded, 150 yards in diameter, and 165 feet high.

The northwest arm of Black Bay is not recommended as an anchorage as it is too deep and narrow. The northeast arm of the bay is 0.4 mile wide. There is safe anchorage close in near the head in 16 to 20 fathoms, mud bottom. A shoal of gravel and boulders extends 100 yards offshore on the east side of the head of this arm. The anchorage is subjected to usual williwaws. A high, light-gray granite peak separates the two arms of Black Bay.

The point, 1.2 miles southward of the western entrance point of Black Bay, has a large granite rock about 150 feet high close to the southern side. The rock makes a good mark when it is seen clear of the point. Between this point and Black Bay is a low grassy wooded ravine extending inland from the coast. Between the ravine and Black Bay are rocky, almost perpendicular cliffs several hundred feet high and light gray in color. The open bay to the westward of the point is not recommended as an anchorage.

**Nuka Bay** has its main entrance between **Pye Reef** and **Nuka Point**. The bay may be entered from the eastward through **McArthur Pass** or **Wildcat Pass** and from the westward through **Nuka Passage**. It extends into the mainland above the passes in two long arms. Good protected anchorage can be found in several small bays and coves. There are several small gold mines in the West Arm and North Arm.

**Nuka Bay** is generally deep throughout. There is, however, a considerable area of irregular depths, less than 25 fathoms, adjacent to the western shores of the lower bay.

**Pye Islands**, on the eastern side of **Nuka Bay**, are three rugged mountainous islands, densely wooded on the lower slopes. **Outer Island**, the outermost and smallest, has a high prominent peak at its eastern end. A good landmark, this peak is part of a ridge whose top is covered with high granite boulders. A prominent bare rock, 70 feet high, is 20 yards off the southeastern shore of the island. A large reef, part of which shows at all stages of the tide, is 300 yards south of the rock. A large, bare, granite rock, 82 feet high, is close to the southwestern point of the island.

A  $2\frac{1}{2}$ -fathom shoal that breaks is 0.4 mile southeast of the eastern point of **Outer Island**. A 10-fathom shoal is 1.8 miles  $130^{\circ}$  from the point, and a 9-fathom shoal is 0.9 mile  $200^{\circ}$  from the same point.

**Pye Reef**, awash at high water, is 2.1 miles  $205^{\circ}$  from the high peak of **Outer Island**. The line of the western ends of **Outer Island** and **Rabbit Island** barely clears to the westward of the reef, and the line of the eastern end of **Outer Island** and **Hoof Point** on **Ragged Island** leads 0.4 mile eastward of it.

**Rabbit Island**, the second of the **Pye Islands**, is densely wooded. The eastern shore of the island is bold and rocky, with no dangers except close inshore.

Between **Outer** and **Rabbit Islands** is a deep body of water with no good anchorage. At its eastern end is a small opening called **Kitten Pass**. The pass is between a small islet and a group of three bare rocks to northward. The islet has a few scrub trees on it. A rock, covered 13 feet and marked by kelp, lies in the pass; it is nearer to the islet than to the rocks.

**Kitten Pass** is only 65 yards wide. By favoring the group of rocks on the northern side, a depth of 5 fathoms can be carried through; but due to strong tidal currents and the narrowness of the pass, it should be attempted only by very small craft, at slack water and with a smooth sea. In rough weather, breakers obstruct the pass.

**Ragged Island**, the third and largest of the **Pye Islands**, is very mountainous, and is partly wooded on the lower slopes. The island is broken by numerous coves and bights, most of which are too deep to afford good anchorage. The few known dangers around this island are the rocks close inshore; a rock awash at high water 200 yards off the rounding point 1.2 miles north of **Wildcat Pass**; and the rocks off **Hoof Point**.

**Hoof Point**, 3.5 miles northeast of **Wildcat Pass**, is the southeastern end of the eastern part of **Ragged Island**. Bold and rocky, it is at the base of a detached hill. A bare granite rock, 105 feet high, 60 yards off the point, makes a good mark. Bare ledges lie 400 yards southward of the point. A rock, covered at high water 0.5 mile southward of **Hoof Point**, can be cleared to the southward by keeping open water showing through **Wildcat Pass**. Fair anchorage for small craft can be had in the cove behind **Hoof Point**, in 10 to 20 fathoms.

**Wildcat Pass**, between **Rabbit** and **Ragged Islands**, is about 400 yards wide in its narrowest part, and is deep and free from danger. A shoal marked by kelp with a least depth of 6 fathoms over it is in the center of the western approach to the pass, 400 yards westward of the line of the western ends of **Rabbit** and **Ragged Islands**. This shoal has deep water all around it. In the eastern approach the only known dangers are the rocks off **Hoof Point**. In the narrow part of the pass a bank, with 8 fathoms over it, extends from the northern point to the center of the pass, but 20 fathoms and over can be found 100 yards off the southern point. The tidal currents in **Wildcat Pass** have an estimated velocity of 4 to 5 knots.

Anchorage can be found in the cove just south of the pass, in 24 to 27 fathoms, rocky bottom. Small vessels can find indifferent anchorage in the cove in the western end of **Rabbit Island**, close inshore, in 8 to 10 fathoms, rocky bottom.

**Wildcat Cove** is a large arm in the southeastern shore of Ragged Island, 2.8 miles northward from Wildcat Pass, and is the second cove westward from Hoof Point. Protected anchorage for small craft can be had about 100 yards from the head of this cove in 11 fathoms, mud bottom. There is also anchorage in 22 fathoms, mud bottom, opposite the indentation on the east shore of the cove.

**Roaring Cove** is a small bight in the western shore of Ragged Island, 2 miles northward from the western approach to Wildcat Pass. A small wooded island is on the northern side of the entrance, and a wooded point, resembling an island, is on the southern side. Partially protected anchorage for small craft can be found in the center of this cove in 4 to 5 fathoms, mud bottom.

**McArthur Pass**, between Ragged Island and the mainland, is about 120 yards wide in its narrowest part but is straight and easily navigated. **McArthur Pass Light** ( $59^{\circ}27.8' \text{ N.}$ ,  $150^{\circ}20.1' \text{ W.}$ ), 45 feet above the water, is shown from a small white house on the north side of the pass.

There are no known dangers in the approaches, and a clear channel 60 yards wide is in the center of the narrowest part of the pass, with a depth of  $6\frac{1}{4}$  fathoms. Both shores of the pass are lined with thick kelp which extends approximately out to the 5-fathom curve. The bottom is composed of smooth rock and small boulders. A spit of gravel and boulders makes out from the southern shore, in the narrowest part, with deep water close to.

The tidal currents in McArthur Pass have an estimated velocity of 3 to 4 knots. All except low-powered vessels will have little difficulty through the pass at any stage of tide, but easterly weather and ebb tide may cause dangerous seas in the entrance.

Extensively used by small vessels proceeding along the coast, McArthur Pass affords a shorter and more protected route than the route outside the Pye Islands, and is especially valuable when used in connection with the route through Nuka Passage.

**McArthur Cove** is a large cove in the northern side of Ragged Island, 1 mile southwestward from the narrowest part of McArthur Pass. Large vessels can find good anchorage near the head of this cove in 28 to 30 fathoms, mud bottom; small craft anchor closer inshore in 5 to 10 fathoms, good holding bottom and good shelter. The two small coves on the northern side of Ragged Island, westward of McArthur Cove, are deep and clear of dangers but are subject to strong williwaws in stormy weather. Indifferent anchorage for small craft can be found in the first cove to westward, in the center of the bight near its head, in 16 to 18 fathoms, rock and gravel bottom; or in 11 to 12 fathoms in the bight on the southern side of the cove, near the center.

**Morning Cove**, on the southern side of the eastern approach to McArthur Pass, affords protected anchorage for small craft near its head in 10 to 12 fathoms, rocky bottom.

**Chance Cove**, on the northern side of the eastern approach to McArthur Pass, is deep, and is a poor anchorage. **Chance Lagoon**, at the head, has a large flat rock in its

entrance. The passage eastward of this rock is foul, but a depth of 8 feet can be carried into the lagoon through the passage westward of the rock, the best water being found by favoring the western side of the passage. Protected anchorage for small craft can be had in this lagoon in 8 to 12 fathoms, mud and rock bottom, but anchors will not hold well in heavy weather. The diurnal range of tide in Chance Lagoon is 11 feet.

Small vessels can find good anchorage in the small bight on the south side of McArthur Pass, close westward of the narrowest part, in 7 to 11 fathoms, mud bottom. This anchorage is subject to strong williwaws, and local fishermen prefer to anchor close inshore, in the open bight on the northern side of the pass, northwestward from McArthur Cove, in 10 to 15 fathoms, rocky bottom.

**East Arm of Nuka Bay** has an average depth of over 100 fathoms. A small rocky bank, with a least known depth of 10 fathoms, is 0.3 mile off the western shore and about 0.5 mile southward of a prominent pinnacle rock, 22 feet high and close off the rounding point in the middle of that shore.

**McCarthy Glacier** discharges into the head of East Arm. The perpendicular face of the glacier is 12 miles back from the edge of the terminal moraine where depths are about 1 fathom or less. Between the edge of the moraine and the face of the glacier the water, carrying an ice pack, is much deeper, no bottom at 10 fathoms being found in one place. The drifting ice from the pack is lifted over the terminal moraine at high tides. On the flood a strong current sets northward across this moraine, and vessels should use caution to keep from being set onto or across it, and into the grinding ice pack. The depths at the head shoal very rapidly.

Ice in East Arm is thickest after spring tides and with northerly breezes will be set into the main part of Nuka Bay, into the entrance of West Arm, and even into Nuka Passage, often interfering with navigation. With southerly breezes, the ice will pack up at the head of East Arm, leaving the main part of the arm clear. With easterly or westerly breezes, the ice will pack along the opposite shore, leaving the main part of the bay and the weather shore free.

The square-shaped bay on the eastern side of East Arm, 2 miles northward from the western entrance of McArthur Pass, affords indifferent anchorage off its southeastern side in 12 to 15 fathoms, rocky bottom. The small bight on the northeastern side of the bay is foul.

**Moonlight Bay**, on the eastern side of East Arm, about 1.8 miles from the head, is deep and clear. Large vessels can find good anchorage near its head in 15 to 30 fathoms, sticky mud bottom. Small vessels can find better protection in **Midnight Cove**, a long bight making off to eastward from the northern side of Moonlight Bay, but they must avoid a 5-foot shoal about 300 yards off the north side of the entrance.

Good anchorage is available in the middle of the cove, just past the turn, in 9 to 10 fathoms, mud bottom, or near the head of the cove in 14 to 16 fathoms, mud bottom. A spit, bare at low water and covered with boulders,

extends out 150 yards from the head of the cove. This cove is the best anchorage for small vessels in East Arm, as it is doubtful that ice would drift in here in quantity.

The small cove just northward from Moonlight Bay has depths of from 5 to 8 fathoms, mud bottom, but with westerly winds is apt to be filled with ice. A narrow spit, bare at low water and covered with boulders, extends out from the head of the cove for 75 yards.

**McCarty Lagoon**, on the eastern side of East Arm at its head, has not been surveyed. The entrance nearly bares at low water, but shallow-draft vessels can enter at high tide. The tidal currents in the entrance have an estimated velocity of 8 to 12 knots, so that high water slack is the only time to enter. Depths of 15 to 20 fathoms, mud bottom, are reported inside the lagoon. The entrance is narrow, with sand and mud bottom. The lagoon probably freezes over in the winter.

**James Lagoon**, on the western side of East Arm at its head, is about 1 mile long and 0.8 mile wide. There is a prominent 90-foot dirt cone on the northeastern side of the entrance. The entrance, about 0.8 mile long, has a least midchannel depth of 3 feet. In entering, favor the western shore to avoid a long sandspit, partly bare at low water, which makes out to southward for about 300 yards from the western end of the large, flat, sandy island on the eastern side of the channel. The tidal currents in the entrance have an estimated velocity of 6 to 10 knots.

Vessels should not attempt to enter James Lagoon except at high water slack. The entrance is often obstructed by ice which is carried through the entrance into the lagoon. The lagoon has general depths of 8 to 15 fathoms, mud bottom. Vessels should approach the shore with caution, since large mudflats make off for a considerable distance, especially along the northern shore. The lagoon may freeze over in the winter.

**Harrington Point**, the southerly tip of the peninsula separating East and West Arms, is bold and rocky, with rocks close inshore. A bank with a least depth of 10 fathoms is 0.6 mile south of the point. Another bank, with a least found depth of 11 fathoms, is 0.5 mile westward of a large rock, 35 feet high, close to the southwestern side of the peninsula.

**West Arm of Nuka Bay** is about 7 miles long in a northwesterly direction from Harrington Point. **Nuka River** and **Ferrum Creek** empty into **Beauty Bay**, the head of West Arm. A large mudflat makes out from the head of Beauty Bay with deep water close-to. The diurnal range of tide is 11.4 feet in Beauty Bay.

**Shelter Cove**, on the southern side of Beauty Bay, is small but affords anchorage with moderate swinging room in 14 to 16 fathoms, mud bottom. At the head of the cove is a grassy flat, in front of which is a large mudflat that covers at high water.

**Diablo Peak**, on the west side of Beauty Bay, is a good mark.

**Yalik Bay**, on the western side of West Arm, opposite Harrington Point, has a shoal with a least found depth of  $3\frac{1}{2}$  fathoms in midbay, 1.2 miles from the entrance. Depths of over 20 fathoms can be found all around this

shoal, the better channel lying to southward. This shoal is the only danger in the bay except rocks close inshore and two rocks, bare at low water, 150 yards off the northern shore 0.6 mile from the head.

Anchorage can be had in the center near the head in 14 to 16 fathoms, mud and gravel bottom, but there is limited swinging room for large vessels. Small vessels can find partially protected anchorage in the small bight on the northern side of the bay, 0.5 mile from the entrance, in 3 to 5 fathoms, and sand bottom.

A reef makes out for 0.2 mile eastward from Yalik Point, the southern entrance point to Yalik Bay. A least depth of 2 fathoms was found at the outer end of this reef. A rock, covered 1 foot and possibly marked by kelp, is about 0.2 mile off the northern entrance point to Yalik Bay.

**Surprise Bay** indents the eastern side of West Arm. Anchorage can be had 0.3 mile from the entrance to the lagoon at its head, in 17 to 20 fathoms, mud bottom.

**Palisades Lagoon**, at the head of Surprise Bay, has a narrow entrance 40 yards wide and 350 yards long which is too narrow and crooked to be navigated by any except very small vessels. A depth of about 4 fathoms can be carried by favoring the eastern side of the entrance until past the point on the western side, to avoid a rock lying eastward of this point; thence favor the western side of the channel into the lagoon. A large sandspit with boulders on it, is on the eastern side of the entrance of the inner end.

General depths in the lagoon range between 18 and 20 fathoms, mud and rock bottom, and afford secure anchorage. The lagoon may freeze over in winter. **Babcock Creek**, a small stream, empties into the lagoon over a large sandflat which uncovers at low water.

**Ariadne Cove** is behind prominent **Ariadne Island** on the south side of the entrance to Surprise Bay. There is good anchorage for small vessels in this cove in 5 to 10 fathoms, mud bottom, but in the winter, with northwesterly winds, the cove becomes quite rough. There are two entrance channels, one on each side of Ariadne Island. The north entrance has a rock, bare at low water, near midchannel southeastward of the island; the best water is eastward of this rock, but care should be taken to avoid reefs which make out from the northern shore of the cove.

The western entrance has a shoal of  $2\frac{1}{2}$  fathoms in mid-approach. A reef bare at low water makes off for 125 yards from the point on the southern side of the entrance. The best water in this entrance is found by favoring the island, being careful to avoid a reef awash at high water extending 60 yards southward from the second point from the entrance on the southern side of the island.

**Quartz Bay** is on the eastern side of West Arm, 4 miles northwestward from Harrington Point. **Beautiful Isle**, a wooded islet with a cluster of bare rocks, is on the southern side of the entrance. A shoal with a least depth of 31 feet is 300 yards westward. Another shoal, with a least depth of 24 feet, is 0.2 mile off the northern shore of the entrance. Anchorage can be found in the center of the

bay, 0.3 mile from its head, in 14 to 18 fathoms, mud bottom. The 10-fathom curve is about 325 yards from shore at the head of the bay. The water shoals very rapidly inside this curve.

**Moss Point** separates Beauty Bay from North Arm. It has a number of grass-covered rocks and wooded islets close-to.

**North Arm** branches off for 5 miles to northward from West Arm. A large flat back of the head of the arm is covered with grass and alders, in front of which is a mud-flat which covers. Deep water approaches to within 250 yards of the head of the arm and to within 100 yards of the low water line.

**Pilot Harbor** is on the eastern side of North Arm about 1 mile from its head. A bare rock, 3 feet high, is 275 yards off the southern point of the entrance and a covered rock lies 100 yards northeastward. A large bare rock, 4 feet high, is 125 yards southward of a wooded islet close off the northern point of the entrance. There is a clear entrance between these rocks. A large shoal area, 200 to 300 yards wide and mostly bare at low water, extends across the head of the bay. Entering in midchannel, a secure anchorage will be found in the middle in 14 to 16 fathoms, mud bottom.

Small vessels can anchor 100 yards to westward of the point that resembles a small wooded islet, on the northeastern side of Pilot Harbor in 5 to 8 fathoms, mud bottom. This is the best anchorage for small craft in North and West Arms in stormy weather.

A small cove, on the western side of North Arm about 1 mile from its head, is very deep, and has no anchorage. A large, prominent waterfall, with a sheer drop of about 900 feet, is about 1.5 miles northwestward from the head of the cove.

**Nuka Island**, on the western side of Nuka Bay, is mountainous and densely wooded on the lower slopes in the northern part and grass covered in the southern part. The eastern shore rises precipitously to the mountain tops and is bare shale and talus formation. The western shore, bordering on Nuka Passage, is broken up into numerous bays and coves.

**Nuka Point**, the southern end of Nuka Island, is fairly prominent. This point is formed by a peninsula with a high peak near its inshore end. The peninsula is connected with the main part of the island by lowland, so that, from a distance, it resembles an island. The eastern and southern shores rise in sheer cliffs, making a landing impossible. Two rocks about 3 feet high are 0.3 mile off the point eastward of the peak, and a reef covers the area inshore of them.

**Nuka Rock**, 3 feet high and 20 feet across, is 0.4 mile south of the southeastern tip of Nuka Point. Irregular depths of less than 25 fathoms extend about 3 miles southward from Nuka Point. A rocky patch of 8 fathoms is 1.5 miles eastward from Nuka Rock; another patch of 8 fathoms is about 2.8 miles northeastward from Nuka Rock, 1.2 miles offshore.

**Pinnacle Rock**, 3 miles northeastward of Nuka Rock

and 0.3 mile offshore, is 68 feet high and the most prominent landmark along this coast. Numerous small rocks and reefs, marked by kelp, lie inshore from this rock.

Along the coast between Pinnacle Rock and Nuka Point, and for 0.5 mile northward of Pinnacle Rock, are numerous rocks, some of which are 250 yards offshore. About 1.5 miles northward of Pinnacle Rock is a small bight, with a cluster of rocks and islets, which is very foul.

Extending about 1 mile southward of the bight and lying offshore from two prominent sand beaches, is an area with sandy bottom. The bottom is smooth, with gradually increasing depths to the 10-fathom curve, nearly 0.5 mile offshore.

A prominent reef 5.2 miles northeastward of Nuka Point and 3 miles southward of the entrance to Nuka Passage makes a good mark. This reef is formed by two large rocks, 25 and 30 feet high, the outermost being the smaller and lying 400 yards off the eastern shore of Nuka Island. Many rocks lie along the coast inshore of this reef, but deep water approaches within 200 yards on the offshore side.

The small inlet about 1 mile southward from the eastern entrance to Nuka Passage is the only important indentation in the eastern shore of the island. Off the northern point of the entrance is a prominent wooded islet about 70 feet high, the outer face of which is bare white granite. There are numerous high, bare rocks, and wooded and grassy islets on both sides of the entrance. The inlet is exposed to southeastward, and the southern side is foul, but small craft can approach its head as follows:

Enter in midchannel and when 200 yards past the wooded islet on the northern side, anchor in 6 to 9 fathoms, sandy bottom. If going to the head of the inlet, favor the northern side above this anchorage to avoid covered rocks lying almost in midchannel. A large sandflat is at the head, with shoal water 125 yards offshore from it. Very small craft can anchor abreast the last point on the southern shore, 200 yards from the low-water line, in 2 fathoms, sandy bottom, but there is very little swinging room. This inlet affords fair-weather anchorage only.

For 1.5 miles northwestward of the inlet there are rocks as much as 250 yards offshore. The last of these is 2 feet high, 300 yards offshore, and makes a good mark for entering Nuka Passage. Deep water is fairly close outside these rocks, the 100-fathom curve lying 0.4 mile offshore.

**Nuka Passage**, between Nuka Island and the mainland, is about 12 miles long from the eastern entrance to the southern entrance.

When used with McArthur Pass, this passage affords a shorter and protected route for vessels proceeding along the coast. It is of special use to small low-powered craft. The passage is deep and is easily navigated in clear weather.

In the approach to the eastern entrance is a bank with a least depth of 8 fathoms 1 mile southward of the point on the north side. Between this bank and the northern shore of Nuka Island are depths of over 100 fathoms. A shoal, with a least depth of 4½ fathoms, is in midpassage, 1 mile southwest of the northern point of the entrance,

and nearly 0.5 mile southeastward of a prominent wooded islet on the northern side of the pass. Between this shoal and the southern shore are depths of 90 fathoms. About 1.5 miles inside the eastern entrance, on the north side, is a small cove open to the eastward; good anchorage is available for small craft in  $4\frac{1}{2}$  to 10 fathoms, mud bottom, and fresh water may be obtained from the stream.

**Division Island**, a group of three wooded islands connected at low water, is in midpassage about 2.2 miles from the eastern entrance. The ship channel is southward of the islands.

A rock awash at high water is 180 yards southward of the eastern tip of Division Island. A rock bare at minus tides is in midchannel north of the island. A shoal with a rock awash extends southward from the western extremity of the Division Island group, reaching almost halfway across the channel towards Hardover Point.

A near midchannel course, slightly favoring the south shore, is recommended in making this passage. The tidal currents have considerable strength.

From **Hardover Point**, the northwestern end of Nuka Island, the pass trends southward toward Gore Point. About 0.6 mile northwestward of Hardover Point, on the northern side of the channel, is a large sand-and-gravel flat which extends northwestward for about 1.5 miles to the foot of Yalik Glacier, a prominent mark. Deep water approaches close to this flat except at its southwestern end where it is shoal for a considerable distance offshore.

**Home Cove**, 1.5 miles southward from Hardover Point, is small.

**Berger Island** is a prominent wooded islet, 25 feet high, about 5 miles southward from Hardover Point. The island is the outermost of a group making off from the eastern shore, and appears from northward to lie in the center of the channel.

A rock 8 feet high is 250 yards northeastward from the island, and a reef bare at low water, extends 85 yards off this rock. A rock awash at low water and not marked by kelp, is 1.2 miles  $213^\circ$  from Berger Island.

About 0.6 mile southward of Berger Island is a grass-covered islet, 45 feet high and topped by a spruce tree which shows up well from the north or south, but blends into the background when viewed from the west. The spruce tree in range with the west tangent of Berger Island to the north, marks the  $3\frac{1}{2}$ -fathom spot in the middle of the entrance to Westdahl Cove.

**Westdahl Cove** is one mile southward of Berger Island. A rocky patch of 13 to 18 fathoms extends nearly across the bay. The anchorage is inside this rocky patch in 22 fathoms, mud bottom. A reef bare at low water and marked by thick kelp, is 0.3 mile westward of the southern entrance point. A  $3\frac{1}{2}$ -fathom shoal is in the middle between the entrance points.

**Yalik Glacier** discharges into the west arm of Nuka Passage. There is good anchorage off the southwestern end of the glacier moraine in 14 to 17 fathoms, soft bottom; however, care should be taken to avoid a 2-fathom rocky shoal about 0.4 mile southward of the low waterline of the moraine and about 0.3 mile eastward of the western shore. An unusual rocky reef, bare at low water, extends 300

yards in a southeasterly direction from the extreme southwestern end of the moraine.

**Petrof Point**, on the western side of the passage opposite the middle part of Nuka Island, is a prominent, low, rounding point with a wide sand beach.

**Petrof Glacier**, which shows prominently from the southward, discharges into the west side of the passage around the base of a prominent ridge about 2 miles southward of Petrof Point.

**Brown Mountain**, between Petrof Glacier and Tonsina Bay, is of a distinctive brown shade during the summer, and has a prominent round shoulder jutting to the eastward.

**Tonsina Bay**, 7 miles northward from Gore Point, is small and marked by a large island, known locally as **Long Island**, nearly in the center of the entrance. The entrance north of Long Island is preferred, as it is deeper and wider. Firm sandflats are at the head of the bay where vessels of any size can be beached in an emergency. On the north side of the northern entrance is a bold wooded islet. About 380 yards southward of this islet is a reef awash at high water. Thick kelp extends between the reef and the islet.

A rock awash at half tide is 660 yards  $275^\circ$  from this reef; it is 250 yards south of the north shore, and there is kelp inshore of it. Numerous rocks and islets make off to northward from Long Island. The northernmost is a well-defined rocky islet sparsely covered with grass and about 25 feet high.

Entrance should be made at low water when the various rocks and reefs are visible. Anchorage can be had in 22 fathoms, mud bottom, northwestward of Long Island in the basin formed by Long Island, the islets, and the mainland. Good anchorage for small craft can be had near the head of the bay in 5 to 10 fathoms, sand bottom.

**Front Point**, rising abruptly to 170 feet, is 5 miles northward of Gore Point, on an island which is separated from the mainland by a narrow band of water about 25 yards wide.

A reef bare at minus tides is 0.4 mile eastward from the point and there are several covered rocks and kelp patches inshore from this danger. The coast from the southern entrance to Tonsina Bay to the blight north of Gore Point has numerous rocks awash at low water, and kelp patches extending about 0.3 mile offshore.

Anchorage can be had anywhere in the blight north of Gore Point by keeping clear of the kelp and avoiding the rock, which bares 3 feet at low water, 300 yards northeast of the well-defined rock point at the westerly end of the blight.

**Charts 8553, 8554.—Cook Inlet**, on the west side of **Kenai Peninsula**, merges with Shelikof Strait through a wide unobstructed passage westward of the Barren Islands. Leading from the Gulf of Alaska to Cook Inlet are Chugach Passage, inside the Chugach Islands, and the passages northward and southward of the Barren Islands. The distance is 1,254 miles from Seattle to the entrance to Cook Inlet at a point 3 miles south of East

Chugach Light, via the outside route by way of Strait of Juan de Fuca. From the entrance it is 48 miles to Seldovia, 59 miles to Homer, and 175 miles to Anchorage.

**Prominent features.**—The shore on both sides of the inlet can be seen in clear weather, but it is sometimes difficult to determine a position on account of the lack of marked features on the eastern shore. Conspicuous and useful marks are Augustine, Iliamna, and Redoubt Volcanoes in the lower inlet, and Mounts Susitna and Spurr in the upper inlet. Prominent in their respective localities are the numerous peaks southward of Kachemak Bay and northward from Kamishak Bay; Anchor Point; the 1,900-foot hill 10 miles from the east shore between Capes Starichkof and Ninilchik; Chisik Island; Kalgin Island; East, West, and North Forelands; Point Possession; and Fire Island.

**Dangers.**—The shoals in Cook Inlet are generally strewn with boulders, which lie on the otherwise flat bottom, give no indication to the lead unless it strikes them, and are not marked by kelp. Most of those located by the survey were found by sighting them at low water. It was noted in places that the boulders rise as much as 30 feet above the general level of the bottom. As a measure of safety, it is considered advisable for vessels to avoid areas having depths no more than 30 feet greater than the draft. At low water, deep-draft vessels should avoid areas with charted depths of less than 10 fathoms.

In general, the shoal banks fronting the marshy parts of the shores in the upper inlet are free from boulders but there are indications that boulders do exist in the deeper water outside these banks.

With an average tidal current there are swirls throughout the inlet, but they do not necessarily indicate dangers as they show in depths of 15 fathoms if the bottom is uneven. Heavy swirls with slight overfalls should be avoided, and any disturbance which has a recognizable wake in the water should be considered as indicating a dangerous rock or shoal.

The waters of the inlet are much discolored by glacial silt. At low water the discoloration may extend to the mouth of the inlet, and at high water it may be comparatively clear to East and West Forelands or even farther north. Frequently with either a flood or ebb current the water above the Forelands appears as liquid mud. This water is very damaging to salt water pumps and shaft bearings.

**Fishtraps.**—A large number of salmon traps line the eastern shore of Cook Inlet. They are pile structures and are required to carry lights at the outer end.

**Anchorage.**—Port Graham, Seldovia Bay, Kasitsna and Coal Bays in Kachemak Bay, Iniskin Bay, Tuxedni Channel, and Knik Arm are the secure harbors in the inlet, and the anchorage at East Foreland (Nikishka) is sheltered from easterly winds. Temporary anchorage in thick weather can be selected at most places in the inlet with the aid of the chart. The great range of the tides must always be kept in mind when anchoring.

**Supplies.**—The principal settlements along Cook Inlet are Port Graham, Seldovia, Homer, Kenai, and Anchorage; supplies and water are available. Water also can be

obtained from numerous streams along all the high shores but is sometimes accessible only at high tide; in the upper inlet the only known streams where vessels can approach the shore close enough to boat water in any quantity are on the north side of East Foreland, on the north side of Point Possession, and in Knik Arm.

**Ice.**—The upper part of Cook Inlet is more or less obstructed during the winter by ice which forms on the flats and in the shallower waters.

During a mild winter or after a period of several days of mild weather, vessels will probably have no difficulty in reaching the head of the inlet and lying at the docks long enough to discharge their cargoes.

During a severe winter or after a considerable period of severe cold, full-powered vessels could probably reach the head of the inlet but because of the heavy masses of ice floating in the strong currents, would find it impracticable to dock without the aid of an icebreaker.

Ice does not generally interfere with navigation southward of Anchor Point except on the western side of the inlet, where large fields of ice are sometimes carried by wind and tides as far as Augustine Island, closing Iliamna Bay for brief periods.

See appendix for tabular detail on ice breakup and freezeup in Cook Inlet.

**Tides and currents.**—The diurnal range of tide in Cook Inlet varies from 14.3 feet at Port Graham to 29.6 feet at Anchorage. Daily predictions for Seldovia and Anchorage are given in the Tide Tables.

Tidal currents in Cook Inlet are strong and must be considered at all times. The small local steamers plan their trips so as to have favorable current and prefer to anchor rather than steam against the current of a large tide. A vessel with a speed of 8 knots, picking up the flood current of a large tide a little northward of Anchor Point, can carry it to Fire Island.

At the entrance to Cook Inlet the tidal currents have an estimated velocity of 2 to 3 knots, and in general increase up the inlet, with very large velocities in the vicinities of Harriet Point, East and West Forelands, and the entrances to Knik and Turnagain Arms. The current velocity measured by the survey ship McARTHUR was 5 knots at anchorage near East and West Forelands, Tyonek, and Point Mackenzie. These anchorages were out of the full strength of the current, and it is estimated that the velocity of the current during a large tide is as much as 8 knots between East and West Forelands and probably more between Harriet Point and the south end of Kalgin Island.

In general, the direction of the current is approximately parallel to the trend of the nearest shore and, when flats are uncovered, parallel to their edges. Off the various bays a set may be expected, toward the bay on a flood current and from the bay on an ebb current.

Information for several places in Cook Inlet is given in the Tidal Current Tables.

The following statements give information not contained in the Tidal Current Tables. Current table information should be relied upon for all localities listed in those tables. The available current information for Cook



Inlet is derived largely from observations near the shores. In the middle of the channel it is likely that velocities are larger and times of current somewhat later than near the shore.

**Dangerous Cape.**—A current of nearly 3 knots sets at times across the broken ground around the cape, causing heavy rips and overfalls.

**Kachemak Bay.**—From Dangerous Cape, a flood current sets up Kachemak Bay with a velocity of 1 to 2 knots in a northeasterly direction, and the ebb flows in a southerly to westerly direction. The currents at the mouth of the bay are uncertain, and may vary from place to place, making it difficult to make correct allowance for set in crossing from Anchor Point to Seldovia.

**Seldovia.**—The currents have an estimated velocity of 1 to 2 knots.

**Knik Harbor.**—The currents have moderate velocity at the anchorage near the shore, and are strong in midchannel.

**Turnagain Arm.**—The currents are very strong and the flood frequently comes in as a bore, with large tides, under certain weather conditions. This bore is said to be 4 to 6 feet high at times, and is very dangerous for small craft. Boats should be beached well above the level of the flats, to avoid the bore when it comes in. The bore can be heard about one-half hour before it arrives, sounding like breakers on the beach; it travels slowly.

**Harriet Point.**—The currents are very swift at Harriet Point, exceeding 5 knots on large tides, and with southerly breezes bad tide rips occur between Harriet Point and Kalgin Island, and extend some distance southward.

**Kamishak Bay.**—In the northern part of the bay, the currents follow the coast, flooding northeastward and ebbing southwestward at a rate of about 1 knot at strength. The current is more noticeable near the shore. With a strong westerly wind, tide rips occur about 2 to 4 miles north of Chinitna Point.

**Routes.**—For vessels approaching Cook Inlet, the chart is the best guide. Entering in midchannel between Perl and East Amatuli Islands, caution is necessary to avoid the two off-lying dangers in the entrance; the  $4\frac{1}{2}$ -fathom shoal 16.2 miles eastward and the  $2\frac{1}{2}$ -fathom shoal 7.4 miles southeastward of East Amatuli Light. Some vessels, approaching from the eastward, pass northward of East Chugach Island and enter the inlet via Chugach Passage, while others pass between Perl and East Chugach Islands to enter the passage. Local knowledge is desirable in using Chugach Passage. Vessels approaching from the southward and passing between East Amatuli Light and the  $2\frac{1}{2}$ -fathom shoal southeastward of it, should make due allowance for the set of the tidal current and, especially during periods of low visibility, keep a sharp lookout for the shoal. Courses inside the inlet should be set as prudent navigation demands, with due allowance for weather conditions and set of the currents.

**Chart 8532.**—Barren Islands, a group of mountainous islands in the middle of the entrance to Cook Inlet between Chugach Islands and Shuyak Island, occupy an area

about 13 miles long and 5 miles wide. East and West Amatuli Islands are bold and precipitous and devoid of trees. They are thickly covered with grass in the depressions and on the less precipitous slopes. In general, the anchorages around Ushagat Island are preferable to the others in the group.

**Tidal currents** of considerable velocity are found in the passages north and south of the Barren Islands, the flood current setting approximately northwestward and the ebb southeastward. Heavy tide rips occur with strong winds in the vicinity of the islands, and are frequently dangerous for small vessels. The wind among the Barren Islands is generally stronger than it is a few miles away.

In the deep water areas of the passages north and south of the Barren Islands and their approaches, the current usually is regular and appears to have less force than along the sides of the passages. At the edges of the banks bordering the islands and on the detached 20- and 30-fathom banks, in fact wherever there is much change in depth, the current increases greatly in force. Such currents are usually, but not always, marked by ripples, eddies, or boils.

Ebb currents set strongly to the eastward along the edge of the bank bordering the north side of the Barren Islands, to the southward between Ushagat and Amatuli Islands, and to the eastward north of Sugarloaf Island. The ebb currents are variable for a few miles southward from the Barren Islands. Farther southward, they set steadily southeastward.

On the flood a narrow band of strong current will be felt a few miles north of the Barren Islands. Some lee from the flood current is afforded closer inshore, but even there a steady set to the westward will generally be found.

The current in general probably does not exceed 4 knots. Reports indicate that slack waters do not occur at the times of local high and low tides, and the navigator is cautioned against assuming such a relation to exist.

**Caution.**—Operators of small boats should take particular care to avoid being caught in tide rips off the Barren Islands. With a moderate westerly sea, wind force 4 to 5, coaming seas in series of three to four high waves have been seen north of Nord Island with sufficient height and force to seriously endanger, if not swamp, the ordinary fishing launch. In moderate weather small boats should not leave these islands until the current sets with the sea.

**Dangers.**—A pinnacle rock, covered  $4\frac{1}{2}$  fathoms, is in the approach to Cook Inlet 16.2 miles eastward from East Amatuli Island Light and 10.7 miles southward of East Chugach Light. The top of the rock is of very small area and apparently is the high point of a larger shoal. It may or may not be marked by a current slick. Another shoal area, with a least depth of  $2\frac{1}{2}$  fathoms, is 7.3 miles  $124^\circ$  from East Amatuli Light. Mariners are cautioned to give both of these shoals a wide berth.

A rock awash at half tide is 1.2 miles northward from the northernmost point of West Amatuli Island.

A bare rock, 8 feet high, is about 0.8 mile west of the northwest point of Ushagat Island. Two rocks awash

at half tide are 220 yards northwest and 0.5 mile eastward of the bare rock.

**East Amatuli Island**, at the eastern end of the group, has high peaks along its length, except 0.8 mile from the southwest end where it drops to a valley having a level of less than 200 feet. A rocky islet, 118 feet high and 200 yards off the eastern end of the island, is marked by **East Amatuli Island Light** ( $58^{\circ}55.0' \text{ N.}$ ,  $151^{\circ}57.0' \text{ W.}$ ), 120 feet above the water, and shown from a small white house. A rock awash is 250 yards east of the light.

**Puffin Peak**, with a conical top on East Amatuli Island, is the highest peak in the eastern group of the Barren Islands.

**Amatuli Cove**, on the north side of East Amatuli Island and close to the west end, affords fair anchorage near its head for small craft, in 6 to 8 fathoms, sand and gravel bottom. With a heavy northeast wind, considerable sea makes into the cove and the williwaws are heavy. Winds draw through the cove with great force, especially from the southeast and south. The holding ground is not good. Kelp grows along the shores, and there is a small stream at the head of the cove.

**West Amatuli Island** is mountainous. A cluster of rocks about 30 feet high is 0.5 mile eastward from the northeast end of the island, with a reef between. A rock, 6 feet high, is 370 yards off the north point of the island. A rock awash at half tide, which does not always break, is 1 mile north of the 6-foot rock.

**Sugarloaf Island** is 1.1 miles southward from East Amatuli Island; deep water is between it and the other Barren Islands. A large grass-covered rock, 95 feet high, is 0.4 mile south of Sugarloaf Island, with foul ground between. A rock awash is 200 yards from the southwest corner of the island and a 10-fathom bank, on which tide rips are common, is about 0.4 mile westward.

**Nord Island** is 1.3 miles northward from the eastern end of Ushagat Island with deep water between. Its southern half is a dome 672 feet high, while its northern half is lower and irregular.

**Sud Island**, 1.1 miles off the southeast side of Ushagat, is high near its southwestern end. Near its northeastern end is a knob 203 feet high. Covered rocks, and rocks awash at low water, extend out 300 yards in many places around the island.

A small rocky grass-topped island, 348 feet high, is 1.3 miles southeastward from the southwest point of Ushagat Island. Foul ground surrounds the island and extends almost to a bare rock 48 feet high, about 1 mile to the southward. A low rock lies between the island and the bare rock. Strong tide rips in this vicinity extend to the southwest end of Ushagat Island. A barrier against the ebb current is formed by the island, rocks, and shoal area, which reduces the strength of the current along the southeast shore of Ushagat Island.

**Ushagat Island**, the westernmost and largest of the Barren Islands, is wide near its western end. Ushagat Island is grass covered except on the tops of peaks and where the cliffs are steep. The trees are spruce, ranging from about 50 feet high near the lake to 3 feet high near the west end. The island is practically inaccessible ex-

cept at the low neck near the northeast end, and at the beaches fronting the valley in the northwest part. The summit of the island is the highest in the Barren Islands. **Table Mountain**, at the northeast end, is separated from the other high land of the island by a low narrow neck. There are several brackish lakes which are probably fresh in the spring.

Two rocks nearly awash at high water are 0.4 mile northward from the northwest end of Ushagat Island. Bare rocks extend 0.4 mile southwestward from the southwest end of the island. The west side of Ushagat Island is indented about 1 mile by a wide open bay with two bights. Good anchorage for all easterly winds can be had in the bight at the north end of the bay.

Anchorage with shelter from southerly weather, and some protection from westerly weather, can be had off the north side of Ushagat Island near the head of the deep bight 2.5 miles from the northwest promontory. Anchor in 12 to 15 fathoms, rock bottom, about 0.5 mile off the two small sand beaches. A small boat can get more shelter by anchoring close in.

Good protection in northerly or westerly weather can be had in the bight on the south side of Ushagat Island, northward of Sud Island. Williwaws are strong, but a small boat can avoid the worst of them by anchoring under the cliffs to the west of the head of the bight. A large vessel should anchor in 12 to 18 fathoms, rock bottom.

**Chart 8531.—Gore Point** is the southeastern end of a prominent headland on the east side of the entrance to Port Dick. From eastward and westward, the headland has the appearance of an island, with **Gore Peak**, near the middle and a broad, high shoulder at the ends, and separated from the highland northward by a narrow gap. The arch in **Arch Rock**, at the eastern end of Gore Point, shows over a small arc from southward, and a folding in the strata in the face of the cliff shows on the south side of the headland.

Within a radius of 1.2 miles of Gore Point, the bottom is very irregular, depths of 14 fathoms being found at that distance off. A depth of  $5\frac{1}{2}$  fathoms was found 0.4 mile south of the point in general depths of 10 to 15 fathoms.

The neck joining the headland at Gore Point to the mainland is low and wooded. On the west side of the neck is a cove affording indifferent anchorage with easterly winds. The south point of the cove is the west end of the headland, and is a shelving ridge of bare rock. Close to this point is a rocky islet, from which rocks, bare at low water, and kelp extend about 200 yards northward. A rock, covered at high water, is about 100 yards from the cliff at the southeast end of the cove. A large kelp area extends about 200 yards northwestward from the rock. The anchorage is in 18 to 25 fathoms, soft bottom, 250 to 300 yards from the beach of the low neck and about 0.3 mile from the cliff on the southern side. The water deepens rapidly northwestward, the swinging room is scant, and the anchorage is uneasy. It is recommended only as a temporary anchorage.

**Port Dick**, westward of Gore Point, extends north for 2.5 miles to the junction of its three main arms. Abrupt shoals lie within a radius of 2 miles about the point at the western side of the entrance to Port Dick. The areas near the point are foul.

**Takoma Cove** and **Sunday Bay** are branches of the arm or bay on the eastern side of Port Dick, 2.5 miles above the entrance. A dangerous reef, covered  $1\frac{1}{4}$  fathoms, is 0.3 to 0.5 mile westward from the south side of the entrance to the arm. Takoma Cove is the anchorage generally used in Port Dick. Sunday Bay has irregular depths and is not recommended as an anchorage.

Anchor in the entrance to Takoma Cove with the shore to the southwestward open with the point at the western side of the entrance to Port Dick; select a depth of 17 to 18 fathoms, sticky mud bottom. In the lesser depths near the head of the cove, the bottom is rocky and has poor holding quality.

**Taylor Bay**, the northeastern arm of Port Dick, extends in a northerly direction for 3.5 miles and is 1.5 miles wide at the entrance. Except for rocks fringing the shores, no dangers were found in the bay. A rock, 4 feet high, is 1.5 miles north of the entrance and 130 yards off the first well-defined point on the east shore. At the beginning of the narrows are two rocks, awash at half tide and about 100 yards off the eastern shore.

At the upper end of the bay is a basin, with depths of 20 to 25 fathoms, surrounded by extensive mudflats.

**West Arm** extends westward for a distance of 7.5 miles. There are two coves on the north side of the arm, 1.5 and 4 miles, respectively, from the entrance. The first cove has two islands in the center. Anchorage can be had eastward of the islands in 16 to 19 fathoms, rock and mud bottom. The westernmost cove is practically bare at low water. At the head of the arm on the south side are two islets, the western one marking the low-water line which extends directly across the arm at this point.

In the southwest approach to Port Dick is dangerous **Gore Rock**, covered  $1\frac{1}{4}$  fathoms, lying 7.5 miles  $244^\circ$  from Gore Point and approximately 3.5 miles from shore.

The second small bay, 5 miles westward of Port Dick, has good anchorage for small craft in 15 fathoms and less. Between Port Dick and this bay the shore should not be approached closer than 2 miles, due to rocks awash extending 1.5 miles off.

**Rocky Bay**, the large bay north of East Chugach Island, is broken by numerous rocks, islets, rocks awash, and shoal spots. The depths are irregular and of little use as guides for navigation. For small boats there is sheltered anchorage in **Picnic Harbor**, which is 220 to 300 yards wide.

Two rocks which uncover 9 feet are 1.2 miles southward from the large wooded island in the middle of Rocky Bay. There is also a  $2\frac{1}{2}$ -fathom spot 1.3 miles southwestward from the east entrance point of the bay.

**Windy Bay**, just west of Rocky Bay, extends 3.5 miles westerly and is 440 yards wide near its head. Good holding mud bottom in  $4\frac{1}{2}$  to 8 fathoms near its head is not recommended as a desirable anchorage because of the strong westerly breeze that draws through the bay. Boats

entering this bay should favor the south side, keeping about 440 yards offshore when north of the southerly entrance point.

**Chugach Bay**, the large bay south of Windy Bay, has a northerly bight with deep water close inshore, and a westerly arm, 2 miles long, with good holding mud bottom. This anchorage, which is affected by a strong westerly breeze that draws through it, can be used by small boats except in easterly weather. The bottom in the southern half of the entrance is broken, with a rocky spot covered  $1\frac{1}{4}$  fathoms.

**Chugach Islands** consist of mountainous East Chugach, Perl, and Elizabeth Islands near the coast of Kenai Peninsula at the entrance to Cook Inlet.

**East Chugach Island** has a low valley through the middle in a northeasterly and southwesterly direction. The southerly peak is 1,450 feet high, and the peak near the west end is higher. The southeast point of the island is a cliff with a peak at its crest and slightly lower land between it and the mountains. The point is marked by **East Chugach Light** ( $59^\circ 06.4' N.$ ,  $151^\circ 26.5' W.$ ), 325 feet above the water, and shown from a small white house on the southeastern end of the island.

Considerable foul ground extends from the island into the passage to the northward. A rock awash at low water is 0.5 mile off the northeast point. A  $\frac{1}{2}$ -fathom, kelp-marked shoal is 1.4 miles northeast of the low-wooded spit at the northwest end of the island. The passage is apparently clear between the  $\frac{1}{4}$ -fathom shoal and the shoal area making off the points at the entrance to Chugach Bay.

The passage between East Chugach and Perl Islands is clear, and is preferred by vessels passing inside of Perl and Elizabeth Islands, because it is considered safe and easy to navigate.

If the passage from Gore Point northward of East Chugach Island is used, care should be taken to make proper allowance for the currents which set in and out of Port Dick and diagonally across the approach to East Chugach Island. This passage should not be attempted unless the weather is clear enough to use leading marks.

**Perl Island** is in the middle of the Chugach group. Its northwest point has a sandspit on the west side and a high cliff on the north side. A light, 80 feet above the water and shown from a small white house, is on the extreme northeastern point of the island.

**Perl Rock**, 87 feet high, is a prominent detached rock about 0.5 mile south of Perl Island. A rock that uncovers is 185 yards westward from Perl Rock.

**Nagahut Rocks**, about 50 feet high, are large prominent bare rocks, close together and connected at low water. They are 1.5 miles westward from the southwest end of Perl Island, with foul ground and no safe passage between them and the island.

**Dora Reef** is a small patch of covered rocks about 1 mile southwest of Nagahut Rocks. The reef is steep-to and breaks at low water with moderate seas.

There is deep water in the passage between Elizabeth Island and Nagahut Rocks; however, a shoal of  $5\frac{1}{2}$  to 7

fathoms lies 0.4 to 0.8 mile eastward from the southeastern end of Elizabeth Island, and a shoal of 4 fathoms is 1 mile westward from the west end of Perl Island.

**Chugach Passage** is between Perl and Elizabeth Islands and the rounded end of the mainland. A lighted bell buoy marks the northeastern side of the channel in the turn of the passage.

The end of the mainland is fringed with reefs. In rounding it from the eastward the outermost danger is a rock, bare at half tide, 0.5 mile offshore, which is 300 yards southward from the small, fairly high, lone rock on the western end of a ledge that bares at low water. The lone rock shows at all stages of the tide.

Chugach Passage is commonly used by vessels entering Cook Inlet from eastward. Depths of 8 to 10 fathoms were found in the shoalest part of the channel between the southeast end of Elizabeth Island and the dangerous reef extending from the mainland. An abrupt rocky spot covered 7 fathoms is about 0.5 mile northwestward of the north end of Perl Island.

Elizabeth Island has two mountain masses, separated by a low valley extending in a northwesterly direction. The northeast point is a sandspit marked by a light, 45 feet above the water and shown from a small white house on a skeleton tower. A depth of  $1\frac{1}{2}$  fathoms is found 0.3 mile east of the light, and a prominent, large, bare rock, 20 feet high, is 0.2 mile northwest. **Cape Elizabeth** is the western end of the island.

**Currents, Chugach Passage.**—Eastward of Elizabeth Island the flood sets northward and the ebb southward with velocities of 3.1 knots and 1.8 knots, respectively. Predicted times and velocities of the current in Chugach Passage can be obtained from the Tidal Current Tables.

It is reported that the turn of the current in the main passage southward of Elizabeth Island occurs earlier, possibly as much as 1 hour, than in Chugach Passage. In the area southward of the Chugach Islands, tidal currents are much stronger near the islands than the deep water farther south.

Heavy tide rips occur from the northwest end of Perl Island to the western end of the passage. The heaviest rips are in the vicinity of Perl Island with an ebb current and easterly wind. Heavy rips also occur off the southeast point of East Chugach Island.

Detailed sailing directions for Chugach Passage are not considered necessary; the chart is the guide, having due regard for existing conditions of weather and set of current. Midchannel courses are clear in the approach to the passage north of East Chugach Island and between that island and Perl Island. Local knowledge is desirable.

**Chart 8588.**—Port Chatham, indenting the end of Kenai Peninsula northward of Elizabeth Island, is a secure harbor for vessels of any size, and easily entered in the daytime with clear weather. During heavy gales some billows are felt at the anchorage, but they are not dangerous.

Below Chatham Island the shores on both sides of the entrance are foul, but above the island the main part of the harbor is clear. The dangers are marked by kelp with the water below half tide. The mountains on either side of the harbor rise abruptly from the water and are wooded about halfway to the summits. There is a small cannery at **Portlock** on the south shore opposite the low grassy spit on the north side. It is reported that vessels of moderate draft can tie to the cannery wharf.

**Claim Point**, on the west side of the entrance, is a wooded hill with a low wooded neck back of it. Bare rocks and kelp extend about 250 yards off the southeast side of the point.

**Chrome Bay** is on the north side of the entrance to Port Chatham.

**Kelp Point** is 0.5 mile northeastward from Claim Point. A bare rock lies 250 yards south of Kelp Point, and a dangerous detached reef with rocks bare at low water is about 300 yards eastward of the bare rock. This reef is covered by kelp, but usually the kelp does not show at high water.

**Chatham Island**, small, low, rocky, and partly wooded, is in the middle of Port Chatham, about 1.2 miles inside the entrance. **Chatham Island Light** ( $59^{\circ}12.6' N.$ ,  $151^{\circ}46.5' W.$ ), 40 feet above the water, is shown from a small white house on the west point of the island.

The channel leads west and north of the island, and the only known danger is a rock covered  $1\frac{1}{4}$  fathoms, 500 yards north of the light. The rock is marked on its southeast side by a buoy. There is deep water on either side of the rock. A depth of  $5\frac{1}{4}$  fathoms was found 250 yards southwest of the light.

The passage east of Chatham Island is foul and should not be attempted by strangers. A rock, covered  $2\frac{1}{4}$  fathoms and marked by kelp, lies 0.4 mile from the eastern shore and 0.7 mile  $165^{\circ}$  from Chatham Island Light.

On the east side, 0.6 mile northeastward from Chatham Island, is a projecting rocky, wooded point, where the port changes direction. The opposite side, northeastward from this point, is a low grassy spit, wooded near its eastern end.

**Anchorage.**—The best anchorage is in the broad part of the harbor 0.8 mile southeastward of the spit, in 10 to 13 fathoms, soft bottom.

At the eastern end of the harbor are rocks showing but little above high water. On the south shore,  $188^{\circ}$  from these rocks, fresh water can be obtained by boats which can be placed under a waterfall at the higher stages of the tide. Just northward of the low grassy spit is an excellent place for beaching a vessel.

**Tides and currents.**—The diurnal range of tide is 14.3 feet at Port Chatham. The tidal currents have little velocity in the entrance and harbor, but in the approach on either side of Elizabeth Island there are strong tidal currents, and at times tide rips.

**Routes.**—When entering Port Chatham from Cook Inlet it is well to keep at least 0.5 mile southward of Claim Point and Kelp Point. When approaching from Chugach Passage, the white scar on the cliffs east of Kelp

Point is a good mark. Keep midchannel between Chatham Island and the north shore, passing about 100 yards southward of the buoy marking the  $1\frac{1}{4}$ -fathom rock northward of the light. From there to the anchorage keep in midchannel.

**Chart 8531.**—Koyuktolik Bay is about 5 miles westward of Port Chatham. Its north shore consists of bare rocky cliffs, while the south shores are lower. The south entrance point is a low yellow bluff. Temporary anchorage for a moderate-sized vessel, in 8 to 10 fathoms, hard bottom, can be found 0.5 mile from the head of the bay. In heavy weather a considerable swell may reach this anchorage. It is constricted by a sand and gravel shoal extending from the south shore and by rocks awash off the north shore.

**Point Adam**, just west of Koyuktolik Bay, is low at the end, and rises in a steep grassy slope to mountains. **Magnet Rock** is 3.3 miles  $345^\circ$  from Point Adams and about 0.5 mile off **Point Bede**. The rock is 25 feet high, black, and prominent.

**Flat Island**, 1.4 miles northward from Magnet Rock, is small, flat, and grass-covered; it is composed of two closely connected islands joined by bare reefs. On the northwest part of the island is a light 70 feet above the water shown from a small white house.

**Chart 8589.**—**Port Graham**, on the east side of Cook Inlet, 4 miles northeastward of Flat Island, is a secure harbor inside Passage Island, and with care is easily entered in the daytime. Its entrance between Russian Point on the south and Dangerous Cape on the north, has extensive outlying reefs, covered at various stages of the tide. The dangers are generally steep-to and marked by kelp.

**English Bay** is an open bight on the west side of **Russian Point**. **English Bay Reef**, bare at low water, is about 1 mile west of Russian Point. There is broken bottom between the reef and the foul ground extending from Russian Point, and strangers should not cross this area. Dangers along the south shore of English Bay may extend farther out than shown on the chart. **English Bay**, a small Indian village with a Greek church, is on the northeast side of English Bay.

**Dangerous Cape** is on the north side of the entrance to Port Graham. **Dangerous Cape Reef** extends 0.5 mile westward from the western side of the cape. **Bird Reef**, 250 yards long, is 0.6 mile southward from Dangerous Cape. The highest rock at the north end of the reef is covered at extreme high tide. The shore reef inside of Bird Reef is composed of rocks awash and some bare rocks. A detached  $\frac{1}{2}$ -fathom rock lies in the channel between Bird Reef and the shore reef. Midway between Bird Reef and Passage Island, and 0.5 mile from the north shore, is a small shoal with  $2\frac{1}{2}$  fathoms, marked by kelp and a buoy. Vessels should pass southward of it, as another kelp-marked shoal makes out 650 yards from the shore.

**Passage Island**, 1 mile inside the entrance, is high and wooded. It is generally fringed with reefs to a distance of 150 yards, and a shelving spit, covered at high water,

extends 350 yards eastward from its eastern end. The end of this spit is marked by a buoy. A reef, with numerous rocks bare and covered at various stages of the tide, extends 0.9 mile southwestward from the western end of the island. **Port Graham Entrance Light** ( $59^\circ 22.4' N.$ ,  $151^\circ 53.0' W.$ ), 50 feet above the water, is shown from a small white house on the north end of the island.

A rock bare at low water and marked by a buoy is 250 yards west of the point on the north shore eastward of Passage Island. This is the worst danger in the north entrance. The channel has a width of 250 yards between the rock and the reef fringing Passage Island.

East of Passage Island the shores are generally fringed with kelp to a distance of 200 yards. The only serious danger is a narrow, sunken reef with kelp which extends halfway across Port Graham from the northern shore 0.6 mile southeastward of Passage Island, and is marked at the south end by a buoy. There are small streams on the shores of the port and a large stream and valley are at its head.

**Port Graham** (1960 population 139) has a cannery and wharf on the south side 2 miles beyond Passage Island. The wharf has a 150-foot face with depths of 15 feet along the middle; large vessels dock port-side-to on a  $321^\circ$  heading. Fresh water is available from October to April of each year. The cannery maintains a small store and emergency supplies of coal and gasoline can usually be obtained.

About 900 yards northwest of the wharf is a shoal extending about 300 yards offshore and marked at its outer end by a buoy.

**Anchorage.**—Temporary anchorage for a small vessel can be selected in the middle of **Coal Cove**, inside Dangerous Cape, in 5 to 10 fathoms, rocky bottom; the shore of the cove is fringed with kelp to a distance of 350 yards. The cove should be used with caution. A better anchorage with more room will be found in the bight on the north shore, northward of Passage Island, in 7 to 10 fathoms; a shoal extends 400 yards from the east side of the bight, and kelp extends 250 yards from its north shore. These anchorages are exposed to a heavy swell in southerly or westerly weather.

When inside Passage Island, anchorage can be had in any part of Port Graham, in 10 to 17 fathoms. One of the best is northward or northeastward of the wharf, in 10 to 13 fathoms, sticky bottom. The cove southeastward of the wharf is shoal.

**Tides and currents.**—The diurnal range of tide is about 16.5 feet. Strong tidal currents, both ebb and flood, set across the mouth of the harbor, but there is little current at or inside of Passage Island. With opposing wind and current, heavy tide rips occur off and well northward and southward of the entrance to Port Graham.

**Routes.**—The safest time to enter Port Graham is at low water, and the better entrance is north of Passage Island. The channel south of Passage Island should not be used by strangers. The chart is the guide.

The entrance southward of Passage Island is approached through a narrow unmarked channel with depths of 6 to 8 fathoms over a rocky bar northward of

Russian Point. The bar channel rounds a reef, bare at low water, which extends 600 yards northward from Russian Point.

**Point Pogibshi** (chart 8531) is a prominent flat-topped grassy point about 50 feet high, with rocky sides, on the east side of Cook Inlet 1.5 miles northward of Dangerous Cape. At this point the coast changes direction north-eastward for about 5 miles to Seldovia Bay.

Kelp extends 0.5 mile off the blight 2.7 miles northeastward of Point Pogibshi.

**Seldovia Bay**, 7 miles northeastward of Port Graham, is a secure harbor in any weather. There are several shoals, covered less than 3 fathoms, in the entrance and the inner part of the bay is very shoal. **Seldovia** (1960 pop. 400; P.O.), on the east side of the bay a mile inside the entrance, has several canneries, stores, small hotels, a hospital, and a Greek church. A local magistrate is in the town.

The March 1964 earthquake caused a bottom subsidence of 3.4 feet at Seldovia. Until a complete survey is made of the area, caution is necessary because depths may vary from those charted and mentioned in the Coast Pilot.

**Point Naskowhak**, on the west side of the entrance to Seldovia Bay, is the northerly of two small high rocky wooded knobs which stand on a low grassy spit surrounding a lagoon. A reef extends nearly 0.3 mile northward from the point, and kelp-marked broken ground extends almost 0.5 mile northeastward. Kelp-marked shoals with a least depth of  $2\frac{1}{4}$  fathoms are 700 yards east-northeastward from the point.

**Gray Cliff**, the eastern entrance point of Seldovia Bay, is a bare rock cliff 60 to 70 feet high marked at the south end by a light, 64 feet above the water shown from a small white house.

**Seldovia Point**, 1 mile northward of Gray Cliff, is a 200-foot high cliff wooded on top. Kelp extends 0.6 mile from shore in the blight northeastward of the point.

**Red Bluff**, 0.2 mile southward of Gray Cliff, is high and reddish in color. Foul ground extends 300 yards westward from Red Bluff to a rock that uncovers 4 feet. This rock is steep to on its western side, and is the principal danger in the bay.

**Watch Point**, 0.6 mile southward of Gray Cliff, is a small 80-foot-high grassy head with a few trees and a short low grassy neck behind it. A high pointed rock is near the eastern shore 300 yards northward of the point.

**Seldovia Entrance Light** ( $59^{\circ}26.6' N.$ ,  $151^{\circ}43.2' W.$ ), 45 feet above the water, is shown from a small white house off the end of Watch Point. Kelp-marked rocks with a least depth of three-quarter fathom are between the light and the Seldovia waterfront to the southward.

The channel to Seldovia is from 400 yards to 100 yards wide between the shoals and rocks extending from either side of Seldovia Bay. These obstructions are marked by kelp at slack water in summer and fall, but the kelp tows under during the strength of the tidal currents. In May 1964, the buoyed channel had a controlling depth of 21 feet.

The best anchorage is in the middle of Seldovia Bay, 0.8 mile southward of Seldovia Entrance Light, in 9 to 10 fathoms, sticky bottom. A small vessel can anchor in 5 fathoms in the channel westward of Seldovia with Red Bluff open westward from Watch Point and the Greek church bearing  $008^{\circ}$ .

**Tides and currents.**—The diurnal range of tide is 17.8 feet at Seldovia. Daily predictions are given in the Tide Tables. The tidal currents have an estimated velocity of 1 to 2 knots.

The city wharf, known as Anderson's Dock, 350 yards southward of Watch Point, has a 110-foot face with 22 feet alongside. Large vessels make a port landing with the stern in deep water. Water and fuel are available. In approaching or leaving the wharf, avoid the covered rock 50 yards south of the wharf.

Radiotelephone and radiotelegraph communications are maintained with the Alaska Communication System.

A small-boat basin protected by breakwaters is in the cove just south of the Seldovia city wharf. A light marks the outer end of the 400-foot north breakwater. The March 1964 earthquake damaged the breakwaters and caused some filling-in in the eastern portion; however, the main or western portion of the basin still had a controlling depth of 12 feet.

The remainder of the cove is nearly dry at extreme low water. A grassy head with a few trees forms the south-west side of the cove which is joined to the main shore by a low narrow neck.

**Chart 8531.**—**Kachemak Bay** is a large bay on the east side of Cook Inlet. The entrance is between Seldovia Point on the south and Anchor Point on the north. It affords excellent anchorage for vessels of all classes and sizes.

**Nubble Point**, 4.2 miles northeastward of Seldovia Point, is a long sandspit, terminating in a rocky knoll, which may be mistaken for Point Naskowhak if not sure of the position. The eastern part of the point is wooded.

**Kusitsna Bay**, between Nubble Point and Herring Islets, has anchorage in 12 to 15 fathoms, good holding ground. The water shoals abruptly to the shore and to the flat which fills the cove formed by Nubble Point; the flat in the cove will be avoided by keeping the easterly end of the point bearing westward of  $014^{\circ}$ .

A rock bare at extreme low water and marked on its northeast side by a buoy is 0.5 mile northeast of the north end of Nubble Point. The buoy marks the entrance between it and Hesketh Island. A least depth of 14 fathoms was found between the rock and Nubble Point by giving the north end of the point a berth of over 200 yards.

**Hesketh, Yukon, and Cohen Islands** are high and wooded. An islet is on the reef which extends 0.5 mile northwestward from Hesketh Island; a rock 60 feet high is at the north end of a reef which extends 0.5 mile northward from Cohen Island; and there is a prominent yellow cliff on the west end of Cohen Island. The passages between the islands should be avoided. **Eldred Passage**, eastward of the islands, is deep near the middle,

except at the north end where there is a bar on which the least depths found were 8 to 12 fathoms.

**Tutka Bay** has no desirable anchorage and is not completely surveyed. Broken ground, on which some pinnacle rocks have been found, extends across the entrance. There was an abandoned salmon cannery on the shore just eastward of the southernmost island in Tutka Bay, 3 miles inside the entrance. The cannery had a small wharf with a 40-foot face and a depth of 19 feet at the inner corner. During the summer season a limited amount of fresh water was available. It is a difficult place for large vessels. Just northwestward of this island is a half-tide rock which closes the channel behind the island to all but small boats.

**Sadie Cove**, the inlet in the east side of Eldred Passage, is not completely surveyed but is apparently clear near midchannel.

**Lancashire Rocks**, 1.8 miles northeastward from Cohen Island, are awash. They are 0.5 mile offshore with foul ground inshore from them.

**Gull Island**, 93 feet high, 5 miles northeastward from Cohen Island, is among a group of prominent bare rocks which are visible about 10 miles. **China Foot Bay**, southward of Gull Island, is nearly dry at low water.

**Homer Spit**, on the north side of Kachemak Bay, is a low gravel and shingle spit, covered with grass and some trees. It is about 4 miles long and from 100 to 500 yards wide. It is described as the longest inhabited spit in the world.

The March 1964 earthquake caused a bottom subsidence of 5.7 feet at Homer. Until a complete survey is made of the area, caution is necessary because depths may vary from those charted and mentioned in the Coast Pilot.

The pilot station for Anchorage and Nikiski Wharf is at Homer Spit. The pilot usually boards incoming vessels about 2 miles southwestward of Coal Point.

**Coal Point**, the outer end of Homer Spit, is marked by **Homer Spit Light** ( $59^{\circ}36.1' \text{ N.}, 151^{\circ}24.5' \text{ W.}$ ), 34 feet above the water. An aero light is at Homer airport, about 3.5 miles northwestward of Coal Point.

On the northeast side of Coal Point is a wharf used by deep-draft vessels. The northeast face is 126 feet long, with a depth of about 18 feet alongside; the southeast face is about 60 feet long, with a depth of about 24 feet alongside. Petroleum products and fresh water in limited amounts are available. The Sterling Highway leads from the wharf to Homer and thence connects with the highway system to other points in the state. The city wharfinger has an office at the head of the dock.

The small-boat basin just northwestward of the wharf was heavily damaged during the March 1964 earthquake. The outer part of the northeast breakwater was destroyed during the quake. The basin is only partially useable, but offers no protection; depths in the basin are about 12 feet.

Excellent anchorage can be had 0.8 mile or more northward of Homer Spit Light, in 10 to 15 fathoms, soft bottom. **Coal Bay**, the bight northeast of Homer Spit, is shoal but there are no outlying dangers.

**Homer** (1960 population 1,247; P.O.), at the base of Homer Spit, is a fishing and farming town with several stores, hotels, and a small hospital. From Homer it is about 142 miles to Anchorage, 158 miles to Seward, and 1,313 miles to Seattle. Radiotelephone and radiotelegraph communications are maintained with the Alaska Communication System. Frequent airplane service is available to Anchorage and neighboring communities, and there is daily mail service from Anchorage. Groceries and fishing supplies can be obtained and there are machine shops in the town.

**Quarantine**.—A Public Health outpatient office is located at the hospital in Homer.

**Customs and Immigration** are handled by Anchorage officials on advanced notice.

**Tide**.—The diurnal range of tide is 18.2 feet at Homer.

**Halibut Cove**, on the south shore about 6 miles east of Homer Spit, affords excellent anchorage in 23 fathoms with good holding bottom. **Halibut Cove Light** ( $59^{\circ}36.1' \text{ N.}, 151^{\circ}12.8' \text{ W.}$ ), 70 feet above the water, is shown from a small white house on the northeast point of **Ismailof Island** on the south side of the cove. A daybeacon, 0.3 mile south of the light, marks a rock awash. The village of **Halibut Cove** (1960 population 25; P.O.) has a school and a cannery with a wharf.

**Bear Cove**, on the south side of Kachemak Bay near the head, offers good anchorage in 12 fathoms, although the williwaws are violent and the swinging room is restricted.

The head of Kachemak Bay consists of extensive mudflats. The north side is bordered with mudflats and the 10-fathom curve is about 2 miles offshore. From this curve the water shoals abruptly toward shore.

From Homer Spit to **Anchor Point** the coast is a line of bluffs, with the greatest height of 750 feet at **Bluff Point**. In front of the bluff is a narrow rock and shingle bench. The depths inside the 10-fathom curve are irregular, and there is a possibility of detached boulders not found by the survey. **Anchor Point Light** ( $59^{\circ}46.2' \text{ N.}, 151^{\circ}51.8' \text{ W.}$ ), 41 feet above the water, is shown from a white tripod on the point.

**Chart 8554**.—The main bluff line recedes about 0.4 mile from the shore at Anchor Point and approaches the coast again about 1 mile to the northward, then continues close to the shore up to Cape Starichkof. The bluff attains an elevation of 270 feet 2.8 miles northward of Anchor Point, then gradually descends to the northward.

At **Cape Starichkof** the bluff recedes again, is less steep, and is covered with vegetation. Northward of the cape the bluff follows the shore, varies from 100 to 240 feet in elevation, and continues nearly to **Cape Ninilchik**.

From northward of Anchor Point to Cape Ninilchik, the coast is free from dangers so far as known, and anchorage can be selected in sand bottom. The survey vessel used an anchorage close inshore just northward of Cape Starichkof, in 6 to 7 fathoms. The holding ground is fair, and there is some shelter from southerly weather.

The 1,000-foot peak 10 miles back of Cape Starichkof

is sharp with a high saddle between it and a slightly lower peak just southward. It is the only prominent and distinctive highland feature between Anchor Point and Forelands.

**Ninilchik** (1900 population 160; P.O.), an agricultural settlement at the mouth of a small stream, is connected by the Sterling Highway with Homer and Anchorage. Radiotelephone and radiotelegraph communications are maintained with the Alaska Communication System. The Greek church and part of the village are prominent offshore. There are several small hand-pack canneries in the vicinity. **Ninilchik Channel Entrance Light** (60°03.1' N., 151°40.0' W.), 100 feet above the water, shown from a skeleton tower on shore, marks the approach from seaward through scattered off-lying rocks to the entrance to a small-boat basin inside the mouth of the Ninilchik River. The light shows brightest in line with the entrance channel, which should be used only with local knowledge. In October 1963, the controlling depth in the improved channel was 9 feet at mean lower low water to the sill, thence 3 feet within the basin through the low-water stages by the sill.

North of Cape Ninilchik the coast is very foul, being characterized by immense boulders not marked by kelp. The boulders apparently rest on comparatively flat bottom, so that soundings give no indications of them. It is probable that many more exist than were found by the survey.

On the western shore of Cook Inlet, from Cape Douglas to Chisik Island, the mountains generally rise abruptly from the water, and Iliamna and Redoubt Volcanoes tower well above the surrounding peaks, affording excellent marks from all parts of the lower inlet.

**Sukoi Bay**, on the north side of Cape Douglas, is shoal and can be used only by small craft with local knowledge. Rocks bare at low water in the middle of the entrance, and a ledge bares at low water between the rocks and the south shore.

The two bluff points 5 and 8 miles northwestward of Cape Douglas are the ends of two sharp, rocky ridges extending from the highland of Mount Douglas. Anchorage can be had in the bight between the points in 13 to 15 fathoms, sandy bottom, with shelter from southerly and westerly winds, but the williwaws are bad during westerly gales. Vessels are cautioned to avoid a rock covered 2 fathoms 3 miles southeastward of Shaw Island. At the head of the bight is a short valley with a glacier. Just clear of the bluff point on the southeast side of the light is a pinnacle rock as high as the bluff. The bight between this point and the northern point of Sukoi Bay appears shoal.

**Shaw Island**, flat and grass covered, is 10 miles northwestward from Cape Douglas and 1.8 miles from shore. A depth of 12 fathoms was found midway between it and the shore. Ledges extend northward from the island for 0.8 mile.

**Kamishak Bay** has not been surveyed southward of Rocky Cove and Augustine Island except for a few reconnaissance lines of soundings. The bottom appears to be

chiefly shelving with sudden changes in depths at the breaks in the bottom stratification. Because of these sudden changes vessels should proceed with caution in the unsounded areas.

The shores of Kamishak Bay are mountainous, with bare-faced headlands and palisades of stratified rock. Grass and alder patches cover the lower hillsides. There is no timber except at the north end of the bay. Northward of Iniskin Bay the lower lands are about half wooded.

The south and west shores of Kamishak Bay are bordered by dangerous reefs. No information is available for a safe passage to the south shore. It is possible, however, to reach the west shore of Kamishak Bay through a break in the reefs. This should be attempted only by vessels having local knowledge of the reefs and condition of the sea. Fishing craft go to the west shore on a rising tide near the time of high water.

The approach is from the south side of Augustine Island, which is passed from 1.5 to 2.5 miles offshore, on a course of 257°. Head for Chenik Head, a low flat cape south of the former village of **Chenik**. **Three Peaks**, a high mountain group 3 miles northwest of Chenik, show slightly on the starboard hand. Avoid the rock ledge which bares at low water and which extends north-northeast from Nordyke Island for at least 1.5 miles. North of this reef is a channel about one mile wide and with a least depth of 6 fathoms. As soon as the line of the reefs is passed change course to 215°. The west part of **McNeil Head** should be dead ahead and the outer tangent of Step Mountain should be dead astern. Anchor 1,100 yards west of Nordyke Island in 6 fathoms, sticky mud bottom. The currents at this anchorage set south-southwest on the flood and north-northeast on the ebb.

**Nordyke Island** is flat and grass topped. Two smaller flat grass-topped islands are southwest of Nordyke Island. A black bare rock about 30 feet high is 0.6 mile offshore from this group of islands. Rock ledges which bare at low water make off from these islets for a distance of 1.5 miles to the north and for a distance of one mile to the south. A series of reefs which bare at low water are like huge stepping stones between Nordyke Island and McNeil Head.

The south shore of Kamishak Bay is reported to be foul. There appear to be large areas of reefs which bare at low water northeast of Akumwarvik Bay.

**Akumwarvik Bay**, **Pinkidulia Cove**, and **Horseshoe Cove** are filled with sandflats which bare at low water.

**McNeil Cove** is shoal and filled with sandflats. The south side of the cove is marked by a prominent headland called **McNeil Head**. Bands of conglomerate rock cross the faces of McNeil Head. **McNeil Islet**, mushroom shaped and about 45 feet high, is located off this headland. A lagoon in the southwest part of McNeil Cove is used as a refuge in stormy weather by small fishing craft, which lie in the mud during low water. **Kamishak**, located on this lagoon, consists of one abandoned cabin. A wagon road 12 miles long leads from Kamishak to the site of a copper claim.

South of **Amakdedulia Cove** are hills and cliffs having



a green and yellow tinge. Three flat-topped islets about 35 feet high are off these cliffs. Fingers of reefs spread out from the islets for about one mile.

**Chenik Head** is a low flat cape about 50 feet high on the north side of Anakdedulia Cove. A rock ledge bare at low water makes off this point for a distance of about 0.8 mile. An isolated rock 10 feet high is located on this ledge about 0.2 mile offshore. North of Chenik Head are two small islets which serve as markers for vessels crossing the line of reefs.

**Amakdedori Beach** is a long stretch of sand beach heavily strewn with drift of all kinds. Clear water is reported to lie close in and parallel to the beach but much foul ground is reported farther offshore.

North of Amakdedori Beach is an extensive stretch of conspicuous palisades. Above these and near the western end is a dome-shaped peak about 2,000 feet high.

**Contact Point** is a round-topped headland about 400 feet high surrounded by precipitous bluffs. It is conspicuous from the vicinity of Augustine Island. A tall pinnacle rock close to the headland identifies it when viewed from the southeast. A submerged ledge is reported to extend 3 miles offshore from Contact Point.

The entrance to **Bruin Bay** is north of Contact Point. On the south shore of the bay and just inside the entrance are several buildings and radio masts. Bruin Bay is reported to be shoal, almost baring at low water. Near the entrance, a rock ledge extends north from the south shore; farther in, a rock ledge extends south from the north entrance headland. The outer approach to Bruin Bay has a fairly even bottom with depths of from 5 to 8 fathoms. The bottom is hard green mud and sand.

The shoreline northeast of Bruin Bay is rugged. A waterfall 3.3 miles northeast of Contact Point is conspicuous. **Fortification Bluffs** are bold, angular-edged palisades with faces of stratified rock. **Step Mountain** is the headland on the south side of Rocky Cove. Two flat areas below the peak form steps on the side of the mountain. **Rocky Cove** is obstructed by reefs, bare at lowest tides, which extend 2 miles offshore. **Ursus Cove** is exposed to a heavy swell in easterly weather. The bottom is very broken.

**Augustine Island** is a high volcanic, conical peak from which steam frequently discharges. The upper slopes are barren, but the lower parts of the island are covered with grass, brush, and alder. There are also a few groups of spruce trees. The shore is low, with bluffs in places, and is generally strewn with boulders. A boulder reef extends about 0.8 mile off the northwestern shore of the island. The north end of the island, terminating in **Burr Point**, consists of numerous small mounds of boulders with sloughs between. The west end of the island is detached from the main part by a lagoon, the entrances to which are partly blocked by boulders. A second lagoon, inland from the cove on the southwest side of the island, is also partly blocked at the entrance but has been used as a loading basin by a power scow, which entered at high water.

The southwest cove is much used by fishing craft as an anchorage. It has an even bottom of coarse sand, green mud, shell and gravel. The depth is from 4 to

5 fathoms. Anchor off the sandspit on the east side of the cove; the west side should be avoided because of reported boulders on the bottom. Huge boulders can be seen near the entrances to the two lagoons.

5 An unsurveyed bank having depths of 3 to 4 fathoms extends over 3 miles westward of Augustine Island. A second unsurveyed bank having similar depths extends for 1.5 miles off the southwest point of the island.

**Augustine Rocks** are 9 miles southward from the peak of Augustine Island. They are two flat rocks, with a smaller one between, all covered at high water. Their position is reported to be generally marked by kelp or breakers.

15 **Chart 8665.**—**Iliamna Bay** is on the north side of Kamishak Bay 13 miles northward from Augustine Island. Its western arm is called **Cottonwood Bay**. The greater part of the bay is filled by a flat but there is good anchorage just inside the entrance. The shores are mountainous and there are no trees except the cottonwoods on the flats at the heads of the bay.

**A.C. Point**, on the east shore of the bay about 2 miles northwestward from North Head, is often used as a landing place.

25 From the small native village in the cove in the west shore a mile from the north end of Iliamna Bay, a road leads for about 10 miles to **Old Iliamna** (see chart 8554), a village along Iliamna River. From Old Iliamna, a draft of about 3 feet can be carried through Iliamna Lake (chart 8502) and Kvichak River to Bristol Bay.

30 **White Gull Island** (59°37.1' N., 153°34.3' W.), grass covered and about 70 feet high, is conspicuous near the middle of Iliamna Bay just inside the entrance. The bay shoals gradually from 7 fathoms in the entrance north of White Gull Island to 2 fathoms in the entrance to Cottonwood Bay. Anchorage in 4¼ to 5 fathoms, soft bottom, can had 0.8 mile inside the entrance to Iliamna Bay with the northern side of White Gull Island in range with the south point at the entrance, and the north point at the entrance bearing 106°. The anchorage is exposed to east and southeast winds and there are heavy williwaws with westerly winds, but it is regarded as secure during the summer.

35 It is reported that Iliamna Bay does not freeze but that drift ice in large quantities sets in at times from the upper inlet. Fresh water can be obtained from streams on the northeast side about 1 mile inside the entrance. Northerly gales prevail in winter and heavy williwaws are reported to come from the mountains on the northeast shore. The prevailing summer winds are down the bay and are frequently fresh, especially on bright days.

**Tides and currents.**—The diurnal range of tide is 14.5 feet in Iliamna Bay. The currents at the anchorage have an estimated velocity of 1 to 2 knots.

50 In approach to Iliamna Bay the depths are 6 to 8 fathoms several miles from shore, and these depths extend close to Turtle and Black Reefs. Enter the bay between North Head and White Gull Island. When in the bay care must be taken to avoid a reef, partly bare at low water and with 2½ to 3 fathoms close-to, which

extends 0.4 mile eastward from the south point at the entrance to Cottonwood Bay.

**Turtle Reef** extends over 0.4 mile eastward from **South Head** at the entrance of Iliamna Bay. The reef is largely bare at low water, and is about 15 feet high at its highest point.

**Black Reef** is 0.5 mile from shore and 1.1 miles eastward from **North Head**. The highest points of the reef are two rocks, 5 to 10 feet high. Lying 0.5 mile north-eastward of **Black Reef** is another reef which covers at half tide; its southern end is 0.5 mile from shore.

**Chart 8554.**—**Iniskin Bay**, on the north side of **Kamilshak Bay** eastward of **Iliamna Bay**, is a secure harbor in any weather, although subject to some williwaws from the high sharp bare peaks on the west shore.

The eastern shore is generally low and alder covered. The western and upper parts of the bay are filled with boulder-strewn flats, bare at low water, and the eastern part is shoal and fringed by a reef. The channel is nearly 0.8 mile wide at the entrance and tapers to a narrow slough at the head.

**Local magnetic disturbance.**—Differences of as much as 3° from normal variations have been observed in **Iniskin Bay**.

Three small islands with outlying reefs lie on the east side of the entrance of **Iniskin Bay**. The northerly and largest is **Scott Island**, about 40 feet high and partly wooded, and from it a reef with rocks about 15 feet high extends 0.5 mile northwestward. The middle island is about 35 feet high, and from it a reef extends 0.8 mile southwestward, terminating in **Iniskin Rock**.

**Iniskin Island**, outermost of the three mentioned above, is 50 feet high on the north side, and from it a reef partly bare at low water extends 0.5 mile southwestward; lying 1 to 1.3 miles southwestward from the islet is **Iniskin Shoal**, a sunken reef with little depth, which does not break in heavy weather. These reefs rise abruptly from depths of 5 to 8 fathoms.

**Iniskin River**, at the head of **Iniskin Bay**, is navigable for boats of not more than 3-foot draft for a distance of about 2 miles above the entrance.

To enter **Iniskin Bay**, avoid the reefs which rise abruptly from deep water and extend about 1 mile from the shore eastward of the bay. Pass more than 1 mile southward of the outer islands off the entrance. When two prominent headlands (59°40.4' N., 153°28.5' W., and 59°41.6' N., and 153°27.8' W.) on the west side of **Iniskin Bay** are in line, steer this range until near the western shore. Follow this shore a distance of 0.3 mile until **Range Peak**, on the north side of **Right Arm** is in line with **Iliamna Volcano**, and then steer this range. Anchor on the range, from 1.5 to 2.5 miles above **Scott Island**, in 7 to 8 fathoms, muddy bottom, where the width of the channel between the 5-fathom curves is about 700 yards.

Water can be obtained from the streams in **Iniskin Bay**, the most convenient to the anchorage being on the west side about 2 miles above the entrance. The tidal current averages 1 knot in **Iniskin Bay**.

From **Iniskin Bay** to **Oil Bay**, the coast is fringed by a reef which extends about 1 mile from shore and rises abruptly. Many of the rocks show at low water. **Pomeroy Island**, 2.2 miles southeastward of **Scott Island**, is small and rocky and has a few trees on its west end. **Big Rock**, which uncovers 15 feet, is 1 mile eastward of **Pomeroy Island**. From **Iniskin Bay** to **Oil Bay** there is a comparatively smooth passage for launches inside the reefs.

From **Oil Bay** to **Chinitna Point** reefs extend about 1 mile from shore in places and rise abruptly from deep water. Rocks show at low water close to shore only. With northerly winds, small boats can get some shelter in **Oil Bay**, **Dry Bay**, and the small bight under **Chinitna Point**.

**Oil Bay** is shallow and open with a sand beach at its head which bares for 0.8 mile from shore. The bottom is rocky and foul for about 1 mile offshore on the west side of the entrance. Abandoned oil wells are located in the valley of **Bowser Creek** about 2 miles from the head of the bay. From **Oil Bay** a valley leads through to **Chinitna Bay**, and a good trail to **Iniskin Bay** extends along the north side of **Mount Pomeroy**.

**Dry Bay** is a rocky shoal bight between **Oil Bay** and **Chinitna Point**. It has a sand beach at its head.

**Chinitna Bay** is shoal, and an anchorage in 4 to 5 fathoms in the entrance is exposed to all easterly winds. The bottom is muddy and good holding ground, and anchorage can be selected anywhere in the bay where there is sufficient depth to remain afloat at low water. There are strong williwaws with westerly winds. The bay is filled with ice during the winter. Tidal currents average 1 knot in **Chinitna Bay**.

**Gull Island**, 100 feet high, rocky and grass-covered, is on the south side of the entrance to **Chinitna Bay**. Reefs extend 0.6 mile northeastward and southeastward from the island. A deep channel, 0.3 mile wide, leads into **Chinitna Bay** between **Gull Island** and the mainland to the southwest.

From **Chinitna Bay** to the prominent waterfall 5 miles southward of **Chisik Island**, the coast is low and wooded, with lagoons and marshes in places, and some quicksand. Along **Tuxedni Channel** the coast comprises rocky bluffs and rises abruptly to highland.

An extensive shoal, with rocky, very irregular bottom and indications of boulders, extends 6 miles from the west shore between **Chinitna Bay** and **Tuxedni Channel**. The least depth is about 3½ fathoms, but there is probably less. Deep-draft vessels should avoid areas with depths less than 10 fathoms. Tide rips mark the shoal except at slack water, and are dangerous for small craft in heavy weather; the heaviest rips are near the extremity of the shoal, about 6 miles offshore.

**Iliamna Volcano** is an important landmark. Steam generally issues from fissures just below the summit and from one of the lower peaks on the southeast slope.

**Chisik Island** has a narrow ridge, comparatively smooth on top, that slopes gradually upward from the southeast end of the island to its northwest end where it terminates in a conspicuous cliff. **Chisik Island Light** (60°05.7' N.,

**153°33.6' W.**), 215 feet above the water, is shown from a small white house on a skeleton tower on the south end of the island; a reef extends 0.3 mile southward.

**Tuxedni Channel**, on the southwest side of Chisik Island, is a secure anchorage. Heavy williwaws occur with gales from any direction, and raise a choppy sea dangerous to open boats. The channel is reported to be blocked with ice from December to March.

**Snug Harbor** is generally accepted as including all the waters of Tuxedni Channel from Chisik Island Light to the cannery about 1 mile inside the entrance. These waters are quite well protected from all winds except williwaws blowing from the north end of Tuxedni Channel. The holding ground is good throughout the entire area and safe anchorage can be found on either side of the channel except when floe ice is present to varying degrees between November and May, depending on the severity and the stage of the tides when the ice leaves the lagoons and streams at breakup time.

The cannery maintains a wharf and tie-up piles from the first week in May until about the 20th of August. This 100-foot wharf has 16 feet of water at its face at mean low water, and when removed the stub can only be approached at 18-foot tides or greater. After the season, two caretakers remain at the cannery. There is no regular store open when the cannery is not operating, but water and emergency radio communication are available through the caretakers.

**Tides and currents.**—The diurnal range of tide is 16.6 feet in Tuxedni Channel. The current floods northward at a velocity of 1.1 knots and ebbs southward at a velocity of 1.9 knots.

**Tuxedni Bay** consists largely of shoals and reefs. A narrow channel extends from Tuxedni Channel nearly to the head of the bay. This channel shoals rapidly after leaving Chisik Island. The passage northward of Chisik Island should be avoided, even by small craft.

To enter Tuxedni Channel give the south end of Chisik Island a berth of over 0.5 mile, keep in midchannel until about 2 miles inside the entrance, and then follow the Chisik Island shore at a distance of 0.5 mile. The anchorage is about 3.5 miles above the light, in 15 to 17 fathoms, sticky bottom, and has a clear width of 0.8 mile. On the island side the shore is bold but a shoal makes out 0.6 to 1 mile from the main shore abreast the anchorage; the shoaling is abrupt on the sides of the channel and there are boulders in places on the shoals.

**Chart 8553.**—From Tuxedni Bay to Harriet Point the western shore of Cook Inlet is a gravel bluff with trees on top and a few boulders in the water. **Redoubt Point**, 7 miles northeast of Tuxedni Bay, is an alder-covered bluff from 200 to 300 feet high, with a number of bare slides. There are boulders in places on the shoals which fringe this shore, and vessels should proceed with caution when inside the 10-fathom curve.

**Redoubt Volcano** is an important mark 15 miles inland from Harriet Point. There is a notch on its southeast slope just below the summit.

**Double Peak**, 15 miles northward of Redoubt Volcano, has two knobs on top, and is easily identified from the inlet.

**Harriet Point** is a clay bluff about 100 feet high, with boulders at the water. A boulder reef bare at low water extends 0.8 mile eastward from Harriet Point. The point should not be approached closer than 1.5 miles on the line of the reef.

Fair anchorage is available in moderate weather on the north side of Harriet Point, which so far as known is safe during the summer except for southerly, southeasterly, and northeasterly gales. Very small vessels can anchor in about 5 fathoms about 0.5 mile from shore, with the point bearing 177°. At the anchorage the ebb current has a velocity of 2 to 3 knots, while the flood current is weak and of short duration.

From Harriet Point to West Foreland the shore of Cook Inlet is generally low and backed by patches of woods which appear continuous, and is subject to overflow at extreme high tides. It is fringed by a flat which extends off a greatest distance of 2.5 miles in the light northward of Harriet Point and at the north end of **Redoubt Bay**. The edge of the flat is generally steep-to, but no boulders were seen on those parts lying in front of the marshy shore. **Drift River** is shallow, rapid, and obstructed by rocks and snags.

A prominent wooded butte is 4 miles inland and 14 miles westward of West Foreland.

**Kalgin Island**, wooded and fringed with boulders, is higher at its north and south ends. **Kalgin Island Light** (60°29.2' N., 151°50.3' W.), 140 feet above the water, is shown from a small white house on the northeast point of the island.

A shoal extends 16 miles southward from Kalgin Island. There are spots bare at low water for nearly 8 miles from the island, and thence southward the least depths found are 1½ to 2¼ fathoms. The bottom is very broken. Lesser depths than found by the survey probably exist, especially between the shoaler lumps. No boulders show at low water, however, except near the island.

A passage with general depths of 12 to 15 feet, which is used by cannery tenders, leads across the shoal from 1 to 2.5 miles southward of Kalgin Island. A range should be picked up in the opening northward of Chisik Island to insure making the course good, as the currents on either side of the island have a velocity of 3 to 4 knots at times, and are nearly slack in the lee of the island. There are boulders near Kalgin Island and possible in the passage.

A sand shoal or ridge about 2.5 to 3.5 miles westward of Kalgin Island uncovers about 7 feet at the highest point near its middle. The shoaling is abrupt on the sides.

A boulder-strewn shoal with depths of 7 fathoms or less extends 8 miles northward from the northeast point of Kalgin Island. The outer boulders which uncover are 2.5 miles from the island in depths of 22 feet. It is advisable to proceed with caution where the depths are no more than 30 feet greater than the draft.

Small vessels can select anchorage off the middle of the north end of Kalgin Island, with good shelter from south-

erly gales drawing up the inlet. The holding ground is good and the currents are as weak as will be found at any of the exposed anchorages. Caution must be observed, however, at low water when crossing the broken boulder-strewn area where depths of less than 7 fathoms make off from the north end of the island.

The highest parts of the shoal between Kalgin Island and West Foreland uncover between 3 and 4 feet. Although the shoal is rocky in places, no boulders show at lowest tides. There are boulders in places on the bottom between the shoal and West Foreland.

**West Foreland** is a flat headland with a bluff at the water. The shore at West Foreland and for a distance of 4 or 5 miles northward is fringed with boulders which extend below low water.

**Kustatan River** has its entrance 3.5 miles westward of West Foreland. It connects inland with **McArthur River**, which enters the inlet 12 miles northward of West Foreland; this route is used by the native hidarkas when going to Tyonek.

For a distance of 8 miles northward from West Foreland the bluff is at the water, and numerous boulders are on the beach. The bluff then trends inland to a conspicuous wooded ridge, 5 miles long and 300 feet high, which is 2.5 miles inland at its northern end.

For a distance of 15 miles northward from the end of the bluff, the shore of **Trading Bay** is flat, grass covered, and subject to overflow, and has several sloughs. This part of the bay is fronted by a flat which extends off a greatest distance of 2.1 miles at the mouth of **McArthur River**. This river is about 1 mile wide at its entrance at high water, but due to a bar across its mouth it cannot be entered at low water.

**Nikolai Creek** is a narrow slough 19 miles northward of West Foreland. A depth of 1 to 2 feet at low water is in the channel across the flat. A depth of about 15 feet can be taken into the river at high water. The water in the river is fresh nearly to its mouth except for a short time at high water.

About 3 miles east of Nikolai Creek is a prominent gulch with a small stream in it. The bluffs come to the shore at the gulch and continue around North Foreland. Anchorage a mile off the gulch is in  $3\frac{1}{2}$  fathoms, hard bottom.

**Granite Point** is a prominent gray bluff a mile eastward of the gulch. Between the point and North Foreland, 5.5 miles to the east-northeastward, is **Beshta Bay**, a shallow bight with anchorage in 7 to 10 fathoms, mud and gravel bottom. The anchorage is good during moderate weather or with offshore winds. Care should be taken to avoid the rocky shoal that bares at low water and extends a mile from shore 1.5 miles eastward of Granite Point. The flood current has a velocity of 4 to 5 knots and the ebb 2 to 3 knots.

**North Foreland**, on the northwest side of Cook Inlet 25 miles above West Foreland, is a bluff about 150 feet high at the shore end of a hilly wooded ridge; thence northward the bluff is lower. **North Foreland Light** ( $61^{\circ}02.8' N.$ ,  $151^{\circ}10.1' W.$ ), 21 feet above the water, is shown from a tower on a small white house at the foot of the bluff.

**Tyonek** (1960 population 187; P.O.) is a native village near the mouth of **Indian Creek**, 1.5 miles northeastward of North Foreland. The village has a Bureau of Indian Affairs school. Vessels call at Tyonek, and a landing strip just north of the village is suitable for light planes. Mail is received once a week from Anchorage.

**Chuitna River**, 3 miles northward of North Foreland, is marked by a low break in the bluff. A depth of about 8 feet can be taken into the mouth of the river at high water, and the tides are felt about 1 mile upriver.

A prominent bluff 150 feet high is on the south side of **Threemile Creek**. Bluffs continue northward for 2.5 miles from this creek, and then the tree line is from 2 to 3 miles inland from the ordinary high-water mark, the strip between being subject to overflow at extreme high tides. This feature continues to within 2 miles of Point Mackenzie.

Beginning at Threemile Creek, the shore is fronted by a broad mudflat. Its low-water edge is about 2 miles off the mouth of Beluga River, 5.5 miles off the mouth of Susitna River, 3.5 miles off the shore eastward nearly to Little Susitna River, and then meets the shore at Point Mackenzie.

**Beluga River** is 11.5 miles northward of North Foreland. The channel through the flats at the mouth of the river has a depth of about 2 feet or less at low water, and is said to shift in the winter and spring from the action of ice.

The effect of the tide is felt in Beluga River 6 to 8 miles above the mouth, and it is said that boats can navigate as far as **Beluga Lake**, about 20 miles from the mouth.

**Theodore River** is 3.5 miles northeastward of Beluga River. Three or 4 miles up, the two rivers are within a mile of each other and there is an easy portage between them.

**Susitna River** is on the north side of Cook Inlet 22 miles northeastward of North Foreland. **Mount Susitna**, a prominent landmark along the upper part of the inlet, is about 6 miles west of the river at a point 13 miles above the mouth.

The channels across the flats at the mouth of Susitna River have depths of 2 feet or less at low water and change during the winter and spring because of ice and freshet action. The channels above the mouth are said to change frequently in the spring and early summer. Vessels navigating the deep channels of Cook Inlet should keep well away from the flats because their outer limits have been known to change drastically.

Launches navigate Susitna River to **Yentna River**, about 20 miles above Cook Inlet, thence run occasionally up the Yentna to the forks about 65 miles from the Susitna. The tides are not felt more than 7 miles from the inlet, and above this the current is swift.

**Alexander** is a small settlement on the west side of Susitna River 10 miles above the mouth. **Susitna** (1960 population 42) is on the east side 18 miles above the mouth and just below the mouth of the Yentna; launches, occasionally towing scows, run to and from Anchorage. Mail is delivered to both settlements twice monthly by airplane from Anchorage.

**Ice.**—See appendix for tabular detail of ice breakup and freezeup for Susitna River.

**Talkeetna** (1960 population 76; P.O.) is 65 miles above the mouth of Susitna River.

**Little Susitna River**, 9 miles westward of Point Mackenzie, is said to be navigable for launches at high water for about 8 miles.

**Cape Kasilof** (60°22.0' N., 151°22.0' W.) is on the east side of Cook Inlet opposite Kalgin Island. The high bluffs characteristic of much of the eastern shore are absent between the cape and Kenai to the northward.

Five miles southwestward from Cape Kasilof and 2.3 miles from shore are **The Sisters**, three prominent rocks, the highest of which is 5 feet. The foul ground back of **The Sisters** extends about 10 miles southward from the cape and is strewn with boulders 15 to 50 feet high.

Temporary anchorage is possible in 4 fathoms a mile from shore a little southward of Cape Kasilof. The area is exposed except in northeasterly weather.

**Kasilof River** empties into the east side of Cook Inlet 2.5 miles northeastward of Cape Kasilof. The narrow winding channel that leads through the inner shallows to the river mouth nearly dries in places but is said to be navigable at low water for vessels drawing less than 6 feet. The entrance channel is marked by a range. The forward range is lighted from April 1 to November 15 each year. Entrance should not be attempted without local knowledge of conditions.

**Kasilof** (1960 population 89; P.O.) is a small agricultural settlement on the north side of Kasilof River mouth. **Cohoe** (1960 population 122; P.O.), another small settlement on the south side of the river mouth has a store. Both villages are connected by the Sterling Highway with Anchorage, Homer, and other points along the west side Kenai Peninsula.

Kasilof River is narrow and has a strong current. Boats drawings up to 6 feet can find good shelter in the river and remain afloat at low water. A bar is said to obstruct low-water navigation at the first bend. Vessels drawing as much as 10 feet enter the river and go as far as 6 miles upstream.

**Ice.**—See appendix for tabular detail of ice breakup and freezeup for Kasilof River.

**Karluk Reef**, 4 miles northward of Cape Kasilof and 3.5 miles from the eastern shore, is partly bare at low water. There are other shoals and submerged rocks between the reef and the shore.

**Salmo Rock**, 9.5 miles northward of Cape Kasilof and 2 miles from shore, is one of the outer boulders off Kenai River and shows well at low water. A covered rock is reported to be about 2 miles westward of Salmo Rock.

**Kenai River** empties into the east side of Cook Inlet 11 miles northward of Cape Kasilof. The shores north and south of Kenai River are strewn with boulders. The bar at the entrance to the river is nearly dry at low water but there are depths of 8 to 10 feet in places in the river. Seasonal buoys mark the entrance channel.

The diurnal range of tide is 20.7 feet at Kenai River entrance. The currents in the river mouth attain veloc-

ities of 5 knots or more. Prevailing winds in the summer are from the southeast and southwest; northeasterly winds prevail in the winter. Fog occurs from December to February, with some fog in the early spring.

**Kenai** (1960 population 778; P.O.), an agricultural town on the north side of Kenai River mouth, has a hotel, several motels and stores, and an airfield. A State deputy magistrate is stationed in the town. Kenai is connected by highway with Anchorage, Seward, and Homer; two airlines serve Kenai. Small boat repairs, and radiotelephone and radiotelegraph communications are available. A conspicuous water tank, painted in red and white checkers, is about 2 miles north of Kenai.

**The Kenai Packers cannery wharf** on the north side of Kenai River has a 190-foot face which bares at low water.

About 2,000 feet southward of the Kenai Packers wharf is the city-owned marginal wharf, with a 100-foot face with about 1 to 2 feet alongside.

Small-boat mooring buoys extend off the Kenai Packers wharf for about 4,000 feet upriver to the site of an abandoned cannery, whose wharf is in ruins.

About 1.5 miles southwestward of the Kenai Packers cannery is the Columbia-Wards Fisheries Cannery. The wharf at the cannery has a 50-foot face which bares at low water; a 40-foot oil pier is about 700 feet downriver from this wharf. During the summer months the cannery wharf is extended to a 100-foot long hammerhead dock on piles; depths alongside are about 4 feet at low water.

At both canneries barges are brought in at high water and allowed to settle in the soft mud at low water for unloading.

**Ice.**—See appendix for tabular detail of ice breakup and freezeup for Kenai River.

**Nikiski Wharf** is a T-head petroleum handling facility at the end of a 300-yard pipeline trestle about 2.3 miles south of East Foreland Light. The T-head is about 250 feet long and there are two mooring dolphins 100 yards northward and southward of it, which are marked by lights. There are depths of 35 feet at the southerly dolphin, 42 feet at the northerly one, and from 42 to 45 feet alongside the T-head. An area, foul with rocks awash and covered, extends from 180 to 400 yards northward of the berth. A shoal area, about 5 miles in extent, with depths of from 2½ to 5¼ fathoms, is about 2 miles off the wharf and marked by a buoy. There is deeper water between it and the wharf. Oil tanks on shore, about 0.5 mile eastward of the wharf, are conspicuous.

**East Foreland**, 60 miles northward of Anchor Point and about 56 miles from Anchorage, is a nearly level wooded headland with a 276-foot bluff at the water's edge. **East Foreland Light** (60°43.4' N., 151°24.3' W.), 294 feet above the water, is shown from a small white house on a skeleton tower on the highest part of the bluff. A shoal, marked near its western edge by a buoy, and with a least depth of 4 fathoms, extends from 2 to 3.5 miles westward of the light.

A barge wharf, about 100 feet long, whose face bares at low water, is at **Nikishka**, 2.5 miles northeastward of East

Foreland. Barges are brought in at high water and allowed to settle in the soft mud at low water for unloading. There is anchorage for small vessels off Nikishka sheltered from all easterly winds. Anchorage farther westward is not desirable, as the holding ground is not good and the ebb current increases greatly in velocity on approaching East Foreland.

**Nikishka Bay** is the bight between Nikishka and Boulder Point, 3 miles to the northeast. Boulder shoals, bare in places at low water, fill the bight.

**Middle Ground Shoal**, which uncovers 6 feet for 3.5 miles of its length, is a long ridge of hard sand with rocky bottom in places, in the middle of the inlet 9 miles northward of East Foreland.

Extensive oil drilling operations are being conducted in the vicinity of Middle Ground Shoal. Private lights and buoys mark some of the oil well structures and appurtenances. Other drilling rigs may exist between the shoal and Anchorage.

From **Boulder Point**, a prominent boulder reef with few breaks in it, extends for 20 miles along the shore to **Moose Point**. For the greater part of this distance the boulders, some very large, show at low water to a distance of 2 miles from shore, and there are occasional ones which show above high water.

A prominent yellowish bluff is 4 miles eastward of **Boulder Point**. **Gray Cliff**, 10 miles northeastward of **Boulder Point**, is a good mark. There is a break in the boulder reef off **Gray Cliff** where a small vessel can approach the shore as close as 0.8 mile and find anchorage in about 5 fathoms, mud bottom, sheltered from easterly and southeasterly weather.

A rock, awash at low water, lies 3.5 miles from shore and 4 miles  $346^\circ$  from **Gray Cliff**. Due to the size of the boulders along this shore, it is not safe to skirt it with less than about 5 fathoms beneath the keel.

**Moose Point**, low and wooded with a grassy flat at its end, is not prominent. Between it and **Point Possession**, a distance of 10 miles, there are few boulders so far as known but the bottom is generally rocky and irregular. **Moose Point Shoal**, 5 miles long and partly bare at low water, begins opposite **Moose Point**, and is 1.8 to 2.2 miles from shore.

A  $2\frac{1}{4}$ -fathom spot, 8.8 miles  $110^\circ$  from **North Foreland Light** is marked by a lighted buoy; shoaling may have taken place between it and the southeastern shore. A shoal covered  $\frac{1}{4}$  fathom is in the middle of **Cook Inlet** about midway between **North Foreland Light** and **Fire Island** and about 8.5 miles north of **Moose Point**.

About 6 miles northeastward of **Moose Point** is a prominent reddish bluff, on the north side of which is a small stream in a deep canyon, the latter showing from south-westward.

**Point Possession**, 36 miles northeastward of **East Foreland**, is on the south side of **Cook Inlet** and on the south-west side of the entrance to **Turnagain Arm**. The point is a low, rounding, heavily wooded headland with a bluff at the water's edge. **Possession**, a small native village occupied only during the summer, is on the western side of the point where the bluff is low and a valley leads inland. A

mile southward of the village the bluff is 140 feet high, and at **Grand View**, 1.5 miles inside **Turnagain Arm**, it rises to 284 feet.

A reef extends about 1 mile off the northwest side of **Point Possession**. There are depths of  $2\frac{3}{4}$  fathoms on its northeastern edge; the northern edge drops off abruptly to depths of 12 to 20 fathoms. The range of the eastern side of **Fire Island** and **Point Woronzof** leads close to the western edge of the reef. Care should be taken when rounding the point at low water not to open this range until well clear of the reef. A current line generally indicates the edge of the reef when the tidal current is strong in either direction.

Temporary anchorage for a small vessel can be had 0.8 mile from shore and 2 miles southwestward of **Possession** in 4 fathoms, sandy bottom. It is sheltered from easterly and southeasterly winds, but considerable sea makes around **Point Possession** at times from the violent northeasterly winds that blow at intervals out of **Turnagain Arm**.

Shoals with least depths of 2 to  $2\frac{1}{4}$  fathoms lie between **Point Possession** and **Fire Island**, in the entrance to **Turnagain Arm**.

On the north side of **Point Possession** temporary anchorage for a small vessel can be had in 4 fathoms, hard bottom, 0.3 mile off a gulch midway between **Possession** and **Grand View**. The anchorage is out of the strong tidal currents that set in and out of **Turnagain Arm**. Water can be secured by boats at high tide from the gulch, but in the late summer the flow is small and the water discolored from flowing over the clay bluff.

About 7 miles northward of **Point Possession** is a mid-channel shoal, the center of which dries. The shoal is about 4 miles long and a mile wide; it is reported to be shifting in position to the southward.

**Turnagain Arm** is only partially surveyed. Most of it is a large mudflat, bare at low water and intersected by winding sloughs. Navigation is safe only for small craft drawing 6 feet or less. Local knowledge is necessary since the channels wind from side to side and are subject to change, and strong currents and tide rips increase the difficulties of navigation. It is reported that sediment from the rivers is causing further general shoaling in the arm. The flood comes in at spring tides as a bore, sometimes attaining a height of 6 feet. Its rate of advance is about 6 knots but the velocity of the current may exceed 6 knots in places.

Small craft generally use the anchorage on the west side of **Fire Island** until conditions are favorable for proceeding up **Turnagain Arm**. The only anchorage in the arm is the narrow channel close to the shore northward of **Burnt Island**, but it is exceedingly uncomfortable and even dangerous for launches when strong easterly winds are blowing down the arm. Best for launches is to beach them on the gradually sloping, smooth sand in the bight on the west side of **Gull Rock** or in the bight 2 miles farther westward.

**Hope** (1900 population 44; P.O.) is on the south side of **Turnagain Arm** 23 miles above **Point Possession**. **Girdwood** (1900 population 63; P.O.) is on the north side

14 miles farther up. Formerly mining towns of some importance, both have stores and can be reached by small boats at high water. Girdwood is on the Alaska Railroad and the Anchorage-Seward highway which follow the north shore of Turnagain Arm. **Portage** (1960 population 71; P.O.) is at the head of Turnagain Arm, 8 miles above Girdwood, and at the mouth of Peace River.

Turnagain Arm is noted for the violent winds which blow out of it whenever the wind is easterly, and is locally referred to as the **Cannon**, which expresses the opinion held of it. With light to moderate easterly winds in other parts of the inlet, a moderate gale will frequently blow out of the arm and a heavy sea and tide rips will be raised from its mouth across to North Foreland on the western shore of Cook Inlet.

**Chart 8557.**—**West Point**, the southwest extremity of **Fire Island**, is 6 miles north-northeastward of Point Possession. **Fire Island Light** (61°07.5' N., 150°16.7' W.), 45 feet above the water, is shown from a small white house on a skeleton structure on West Point. A light, 190 feet above the water, is shown from a small white house on the bluff at **Race Point**, the northwestern extremity.

Fire Island is wooded and has elevations of more than 250 feet in its central part. Near the southwest end are high sandhills, with bare summits, and a small lake. Another lake is in the northeast central part of the island. The shores are mostly high bluffs except at West Point and **North Point**, the northeastern extremity.

**Shelter Bay**, on the west side of Fire Island between West Point and Race Point, is filled with mudflats, bare at low water. Anchorage for small vessels has been recommended in 4 to 5 fathoms off the northern part of the bay, 0.5 mile from shore. The current is strong throughout the flood, but the ebb is weak and after the first 2 hours is nearly slack. With fresh southwesterly, northwesterly or northerly winds, the anchorage has rough seas and tide rips.

**Point Campbell**, on the northeast side of the entrance to Turnagain Arm, is 2.5 miles eastward of Fire Island. The area between is a mudflat that bares at low water.

**Point Woronzof**, 3.5 miles northeastward of Point Campbell, is on the south side of the entrance to **Knik Arm**. **Point Mackenzie**, 2 miles north-northeastward across the entrance to the arm, is marked by a seasonal light, 80 feet above the water, shown from a small white house. A lighted range, just northward of the light, marks the channel at Race Point.

**Anchorage** (1960 population 44,237; P.O.), on the southeasterly side of Knik Arm, 175 miles from the entrance to Cook Inlet and 1,429 miles from Seattle, is Alaska's major seaport and largest city. **Spennard** (1960 population 9,074) is a suburb southwestward of the city. Waterborne commerce includes the receipts of food products, building materials, gasoline, fuel oil, and other petroleum products, while shipments consist of fish, scrap metals, and some commodities. Industries include the

processing of salmon, the king dungeness crabs, clams, and other seafood.

The March 1964 earthquake caused a bottom subsidence of 3.6 feet at Anchorage. Until a complete survey is made of the area, caution is necessary because depths may vary from those charted and mentioned in the Coast Pilot.

**Prominent features.**—When approaching Anchorage, the lights on Fire Island and Point Mackenzie, the gantry cranes on the city dock, the control tower at the International Airport, a number of radio and television towers, cupolas of several buildings, and water tanks in the vicinity of Ship Creek are among the conspicuous landmarks. The northerly tank near Ship Creek is painted in red and white checkers.

**Channels.**—The main channel leads between Fire Island and the sand shoals to the northward of the island. The controlling depth is 24 feet, but a greater depth can be taken to the piers with local knowledge. The channel is marked by a 061° lighted range off Race Point and by buoys at critical points.

**Anchorage.**—The best anchorage for deep-draft vessels is west of Anchorage in depths of 10 to 12 fathoms, silt bottom. The usual anchorage for small vessels is nearer Anchorage in depths of 8 to 10 fathoms. Holding bottom is good and there is little chance of dragging if the chain scope is 5 to 7 times the depth, but the anchor probably will foul in a blow if it remains down through two tides. It is dangerous to remain at anchor in this area when the ice breaks in the spring.

**Dangers.**—In addition to the dangers in Cook Inlet previously described, a shoal area on the north side of the channel northward of Fire Island changes radically from year to year. The crest of the shoal bares several feet at low water. A rock, covered 12 feet, marked by a seasonal lighted buoy, and shoal spots of 15 to 18 feet are eastward of the shoal area. Two 24-foot shoals are in the channel southward of the buoy. A rock awash is about 0.3 mile 028° from Race Point Light. The shoal off Point Woronzof and the flats off Anchorage should be avoided.

**Tides and currents.**—The diurnal range of tide is 29.6 feet at Anchorage. With strong northerly winds the tide level may fall as much as 6 feet below mean lower low water and vessels drawing more than 10 feet should await sufficient tide to insure safe passage. See Tide Tables for daily predictions. Close off the town, the current floods northeastward at a velocity of 1.7 knots and ebbs southwestward at a velocity of 2.7 knots. One mile off the town the current averages 3.1 knot. Strong currents and swirls in the area make navigation difficult, but large vessels going alongside from 1 to 2 hours before high water will find little difficulty in making a port landing. An eddy flows up Knik Arm during the ebb. Vessels anchored close in avoid the stronger currents, which attain velocities of 6 knots or more, at times, in mid-channel.

**Weather.**—Calm and clear weather may prevail at Anchorage while strong breezes and rain are sweeping up Turnagain Arm. The prevailing wind is from the north-

erly direction; a maximum velocity of 57 knots has been reported.

See appendix for Anchorage climatological table.

**Ice.**—Upper Cook Inlet rarely, if ever, freezes solid because of the enormous tidal range. Vessels can navigate Cook Inlet in the winter, but reinforced hulls are necessary; screws can sustain serious damage unless properly protected. The inlet is ice free from about May to November. The ice floes move with the tide, and patches of open water are occasionally visible. Tide and wind action on big floes may cause damage to port facilities, but rarely, if ever, to City Dock.

**Routes.**—From the entrance point to Cook Inlet, 3 miles south of East Chugach Island Light, set courses to pass 6.5 miles south of the west end of Cape Elizabeth Island, 4.5 miles 208° from Flat Island Light, 6 miles west of Anchor Point Light, 5 miles east of Kulgin Island Light, 5 miles 302° from East Foreland Light, and 0.6 mile 330° from Race Point Light. From this position, make good a 073° course to pass 0.2 mile south of the buoyed 12-foot rock, thence 062° to a position 0.75 mile 335° from Woronzof Point, and thence 070° to the City of Anchorage Dock.

**Pilotage** is not compulsory but advisable due to changeable weather conditions, strong currents, and ice conditions. The pilot station for Anchorage is at Homer Spit and vessels may contact the pilot by radiotelephone. Advance notice is advisable.

**Towage.**—Tugs are usually available at Anchorage, but they must lay on the mud at low water, and previous arrangements for their use must be made.

**Quarantine.**—Vessels subject to quarantine are usually boarded at the wharves. There are several hospitals at Anchorage.

**Customs.**—Anchorage is a port of entry.

**Immigration.**—Anchorage is an immigration port of entry and a district headquarters.

**Harbor regulations.**—The Port Commission of the city of Anchorage establishes rates and regulations for the port facilities under their control. The Port Director enforces harbor regulations and assigns berthing at all municipal piers, wharves, and bulkheads.

**Wharves.**—Ocean Dock (61°14.2' N., 149°53.3' W.), under jurisdiction of the U.S. Army Engineers, was severely damaged during the March 1964 earthquake and has been condemned. Berthing facilities are no longer available at the dock.

**City of Anchorage Dock**, 200 yards northward of Ocean Dock, has a 600-foot face which in August 1964, had a controlling depth of 24 feet immediately alongside and about 27 feet, 12 feet off the dock. Level-luffing gantry cranes up to 40-ton capacity are available. The 46-foot dock apron is double-tracked and there is a large heated transit shed and ample open storage. Dockside rail and truck connections serve the Matanuska Valley, the rail belt, Fairbanks, and Kenai Peninsula.

**City of Anchorage oil facility** berth located immediately south of city of Anchorage Dock consists of a 100-foot wood piling mooring platform and two wood piling moorings for dolphins. Six oil lines are available for the discharge

of bulk petroleum products. This facility has a controlling depth of 31 feet alongside.

The cement-company wharf, 400 yards south of Ocean Dock, fronts several silos and a bagging plant. The wharf drier 10 feet alongside. The wharf of a fish and farm-product cold storage plant, 0.5 mile south of Ocean Dock, extends out several hundred feet; the wharf has been condemned and no longer used. A cannery wharf, about 0.1 mile farther south, has a face that bares at low water.

Anderson Terminal, about 200 yards south of the cement company wharf, is used as a barge terminal and has a pier about 800 feet long, with a 110-foot face. Barges are made to settle in the mud for offloading. Two 80-ton capacity booms are available.

A tug and barge company adjacent to Anderson Terminal is available for the hiring of tugs and barges; arrangements for their use must be made in advance through ships' agents.

Anchorage Marina, at the mouth of Ship Creek, is a small undeveloped privately owned small-boat basin. It has a 160-foot float, and the basin dries at low water. Maximum depth in the basin at high water is about 10 feet. Small shops at the marina can provide minor hull and engine repairs. Fuel for small craft is available by truck. Small boats up to 40 feet in length can be lifted out for repairs.

**Supplies.**—There are stores and markets in Anchorage, and marine hardware can be obtained. Gasoline and fuel oils in small quantities must be trucked in. Water is available on the wharves.

**Repairs.**—Repair facilities at Anchorage are limited to emergency repairs to machinery.

**Communications.**—Anchorage is served by coastwise and ocean freight and passenger service; truck lines serve the port via the Alaska Highway.

The city is the railroad, highway, and aerial center for western Alaska. It is the headquarters of the Alaska Railroad, the Government-owned and operated line which connects with Seward, Whittier, and Fairbanks.

Highways connect with places on the Kenai Peninsula and from Anchorage the Glenn Highway joins with the Richardson Highway and the Alaska Highway to provide land routes to Fairbanks, Valdez, and other places in Alaska. The Alaska Highway also provides a land route through Canada to the conterminous United States.

The International Airport, 4 miles southwestward of Anchorage, is the hub of trans-Pacific air service; flights are offered to all parts of the world.

Radiotelegraph, radiotelephone, and cable communications are available.

**Ship Creek**, on the northeast side of the Anchorage waterfront, bares at low water and there is no range for entering. Boats rest on the bottom at low water, and local knowledge is recommended.

From about 7 miles above the entrance to Knik Arm to the head are extensive mudflats that bare soon after high water. The flats are cut by numerous channels and sloughs. The main channel lies close to the west shore



of Knik Arm, then winds eastward and northward; it is narrow and intricate, navigable only on the tide, and then only with knowledge of conditions.

**Knik** (see chart 8553) is a village on the northwest side of Knik Arm about 15 miles above the entrance. 5

Small craft go to Knik at high water and lie on the bottom at the ends of the landings between tides. The channel to Knik is close along the western shore. **Eklutna** (1960 population 50) is on the south bank at the entrance to **Knik River**.

## 5. KODIAK ISLAND

**Chart 8556.**—Kodiak Island and Afognak Island, close together and separated from the mainland southwest of Cook Inlet by Shelikof Strait, are large and have numerous small islands along their shores. The group is about 54 by 155 miles in extent, with its greatest length in a southwesterly direction. The land is rugged and mountainous, with elevations of 2,000 to 3,000 feet along the shores and more than 4,500 feet in the interior. The rocky shores are indented by deep, narrow inlets.

The 1912 eruption of Katmai Volcano, on the mainland 90 miles west of Kodiak, covered this group with a thick deposit of volcanic ash. The effects of the eruption have gradually disappeared and large ash deposits are seen only in a few places.

Kodiak, on Kodiak Island, is the principal business center in the area. Afognak Island, mostly timbered, is a Government forest reserve. Some cattle and sheep are raised, and a few mineral prospects have been located. Salmon canneries operate during the fishing season. The cod, halibut, and herring fisheries also are important; the halibut fleet operates on Albatross and Portlock Banks. The periods of good weather are longer on these islands than on the adjacent mainland, and considerable success has been attained in growing vegetables.

Afognak Island is separated from Kodiak Island by Marmot Bay, Kupreanof Strait, and the passages on either side of Whale Island. These waters provide a direct route from Kodiak Harbor to Shelikof Strait. Kodiak, on the northeast coast of Kodiak Island, lies behind the islands in the northwestern part of Chiniak Bay; one approach is from the north, and the other is from the southeast through Chiniak Bay.

**Weather.**—On Afognak Island the prevailing winds are northeasterly except in spring and again in late summer when they shift to southwesterly and westerly directions. At Kodiak the winds, usually northwesterly in late fall, winter, and spring, shift to northeast in early summer and then to southeast until the end of September. The average wind velocity is 20 knots at Kodiak, and the area is subject to violent williwaws.

Annual precipitation averages 67 inches on Kodiak Island and 53 inches on Afognak Island. Annual snowfall averages 47 inches at Kodiak, and measurable snow has been recorded in every month of the year except July and August.

Mean annual temperature is 41° F. at Kodiak. Extreme temperatures noted were 85° in August and -2° in January. Water temperatures are about 1° lower than air temperatures in summer and 1° to 2° higher in late fall, winter, and early spring. Womens Bay, on the northeast coast of Kodiak Island, is frequently blocked by ice in midwinter.

Fogs are common over the area and are most frequent at Kodiak in June and July. Cloudiness is considerable.

**Chart 8533.**—Shuyak Island appears as part of the northern end of Afognak Island, but is separated from it by Shuyak Strait. The southern portion is densely wooded, with the higher hills showing bare rocky outcrops. Proceeding northward the trees gradually disappear and the northern part is entirely grass covered.

The passage between the Barren Islands and Shuyak Island, see chapter 4, is navigable during the day, and in clear weather; the passage northward of the Barren Islands is generally used if bound for Shelikof Strait from the eastward.

**Latax Rocks**, the northernmost feature of the Kodiak-Afognak-Shuyak Group, are three rocky islets lying in line of the trend of the west coast of Shuyak Island. They are 32, 27, and 20 feet high, the outer one being the lowest and the most ragged. A rock which uncovers 7 feet lies about 0.5 mile northward of the outermost rock, and a reef which uncovers 6 feet lies about 0.4 mile westward of the outermost rock. Several detached shoals lie in the vicinity of Latax Rocks. Ships using the passage between Barren Islands and Shuyak Island should pass northward of Latax Rocks.

**Current.**—In the vicinity of Latax Rocks it has been noted that the current flows in a westerly direction on a rising tide and easterly on a falling tide with velocities reaching about 3 to 4 knots. The current appears to be less in the deeper water in the passage northward of Latax Rocks, see chapter 4.

**Tide rips** in the vicinity of Latax Rocks are particularly heavy and should be avoided by small vessels. See caution as to tide rips in the locality of the Barren Islands, chapter 4.

**Party Cape** is the northwest end of Shuyak Island. It is 182 feet high and grass covered for a mile or more back.

**Dark Island**, between Party Cape and Latax Rocks, is about 0.8 mile in diameter, 108 feet high, and grass covered. Several large black rocks are off the southwest end of Dark Island. **Starr Rocks** which uncover 6 feet, lie between Dark Island and the eastern part of Party Cape.

Currents observed during one-half day in June on the southwest side of Dark Island set westward on the flood with a velocity of 1.3 knots. The ebb velocity was 1 knot.

The passage between Latax Rocks and Dark Island has a 5½-fathom shoal near the middle and should be avoided on account of strong currents.

**Dark Passage**, between Starr Rocks and Party Cape, may be navigated by keeping 0.4 mile off the cape and passing northward of a rock 3 feet high lying 0.6 mile west-

ward of Party Cape. Due to strong currents and heavy tide rips, the passage should be avoided.

Shag Islet and the west coast of Shuyak Island are described later in this chapter.

The northern coast of Shuyak Island from Party Cape to Point Banks is very irregular and fringed with numerous rocks and islets. Heavy currents and tide rips are found along this coast. **Carry Inlet and Shagin Bay**, the main indentations, are narrow and tortuous. They may be used only by small craft with local knowledge. Carry Inlet has its entrance channel about 2 miles southeastward of Party Cape. The narrowest part of Shagin Bay, 1.2 miles from its entrance, contains a midchannel rock which uncovers at minus tides.

**Perevalnie Islands**, 95 feet high and grass covered, lie close to the north shore of Shuyak Island and 0.5 mile westward of Point Banks. **Perevalnie Passage**, between the islands and the mainland, may be used as a boat passage with a depth of about 5 feet.

Temporary anchorage during southerly weather appears feasible 0.4 mile westward of the point 0.6 mile southwestward of the western end of Perevalnie Islands.

**Point Banks** is an island about 0.4 mile long, 130 feet high, and entirely grass covered. The narrow passage between it and the northeastern end of Shuyak Island contains several rocks and is choked with kelp. An aero radiobeacon is about a mile westward of the point.

**Sentinel Island**, a rock 33 feet high 0.9 mile northwestward of Point Banks, is a good landmark from an easterly or westerly direction. Its sides are nearly vertical.

Fronting the east coast of Shuyak Island, 1.5 to 3.5 miles offshore, are a series of reefs and rocks separated by broken bottom areas and extending 7 miles in an approximately true south direction—from a  $2\frac{1}{2}$ -fathom reef, 1.4 miles southeastward of Point Banks, to the vicinity of a bare rock 52 feet high. A similar series crosses the former in the latitude of Sea Otter Island.

Vessels using the passage along the east coast of Shuyak Island, inside the series of reefs and rocks, should proceed with caution. The bottom in this passage is extremely broken. It is considered that only a wire-drag survey would prove the absence of all dangers. The known dangers may be avoided by rounding the southeastern end of Point Banks Island by 0.5 mile until the eastern end of the island bears true north. Then proceed 5.8 miles on course  $175^\circ$  until the prominent group of rocks, highest 15 feet, are a little less than 0.8 mile to the westward, then steer  $205^\circ$  into Perenos Bay. Tidal currents are very strong.

The main approach from seaward to Andreon Bay, Shuyak Strait, and Perenos Bay, is southward of the rocks southeastward of Sea Otter Island and between the 52-foot bare rock and Seal Islands, but its use by large vessels cannot be recommended. Indications of shoals along the approach are numerous, but they have not been examined with the wire drag. There are evidently pinnacle formations in this region. To avoid the known areas of extreme broken bottom steer course  $282^\circ$  from seaward, pass 3.2 miles northward of Tolstoi Point, then 1.9 miles southward of the large rock, 52 feet high, lying southwestward of Sea Otter Island, and then pass 1.5

miles northward of the sharp black rocks lying northward of Posledni Cape.

**Sea Otter Island**, 7.5 miles southeastward from Point Banks, is grass covered, 0.4 mile long, and 105 feet high. Bare rocks and breakers extend to the east and southeast for 2.3 miles.

**Little Fort Island**, 85 feet high, off the east coast of Shuyak Island and 8 miles southward of Point Banks, is grass covered and marks the entrance to Andreon Bay. **Big Fort Island** forms the south side of the bay. **Big Fort Channel** separates the island from the mainland. This channel bares at half tide. Anchorage for small boats may be had in **Andreon Bay** near the entrance to Big Fort Channel in 12 fathoms, muddy bottom. The axis of the entrance channel is a little less than one-third the way from the northeastern end of Big Fort Island to Little Fort Island, it then follows the rounded northern end of Big Fort Island about 350 to 400 yards offshore.

Shuyak Strait has a navigable entrance at its western end and is described later in this chapter.

**Perenos Bay** on the north side of **Afognak Island**, lies between the east entrance to Shuyak Strait and **Posledni Point**. The northwestern part of the bay is foul. Anchorages may be found in several arms of Perenos Bay, but the approach to the bay from seaward is characterized by a very broken bottom, as described above.

**Delphin Bay** is the western one of the southern arms of Perenos Bay. The channel westward of tree-covered **Delphin Island** is foul. In the center of the passage eastward of the island are rocks and the best water is 270 yards off the eastern points of Delphin Island. Boats can anchor in 16 fathoms, hard bottom, in the center of the head of the arm, after passing the island. A heavy swell comes into Delphin Bay in northerly weather.

**Discoverer Bay**, the southeast arm of Perenos Bay, has excellent anchorage in 15 fathoms, muddy bottom, east of **Discoverer Island**, tree covered and northernmost in the bay. A  $3\frac{1}{4}$ -fathom shoal lies about 0.5 mile northwest from the east entrance point, and a 1-fathom spot lies between the shoal and the point. Small boats can enter the channel on the west side of the island and go to the head of the arm.

**Phoenix Bay**, the arm of Perenos Bay just west of **Posledni Point**, is a good anchorage for all weather except northwest; anchor in 10 to 17 fathoms, muddy bottom, 1.2 miles from the entrance. **Shields Point** forms the eastern entrance of the bay.

**Seal Bay** in general, extends from **Posledni Point** to **Tolstoi Point**. From a point 1.1 miles northward from **Posledni Point** a series of rocky islands and reefs extend in an east-southeast direction across Seal Bay. Navigation in this area should not be attempted without local information.

**Tonki Bay**, on the west side of **Tonki Cape**, has two arms separated by a headland. A 106-foot rocky islet lies 0.5 mile northward of the headland. Three rocks, covered at high water, lie about 0.3 mile from the eastern shore and 2 miles southward of **Tonki Cape**. Anchorage is about 0.3 mile from the head of the eastern arm in 10 fathoms, soft bottom, but it is not secure with northerly

winds. Small boats may anchor in the small cove on the east side of the head of the eastern arm in 8 fathoms, muddy bottom, in any weather.

The western arm of Tonki Bay extends 6.5 miles south of the headland separating the two arms. Anchorage may be had in 18 fathoms, muddy bottom, about 0.3 mile from head of the arm.

On the eastern part of Afognak Island is a series of mountain ridges with low depressions between them running through the island from north to south. From a distance Marmot Island appears as the easternmost of these ridges. The lower parts of Afognak Island are wooded, except its eastern coast, and its southwestern end southward of Paramanof Bay.

**Caution.**—In making Tonki Cape or Marmot Strait from the northward, a very irregular set to the westward has been experienced. In foggy weather a vessel is liable to be too close to the breakers off Sea Otter Island unless precautions are taken. Likewise in running to this locality from Seward, abnormal set has been experienced. From the experience of a survey vessel making these runs and in lying-to offshore, there seems to be two factors for which allowance should be made. First, if the run is made during the time of a flood spring tide, extra allowance should be made for set to the westward. Second, if the course of the vessel passes over a bank or even a locality where the water is shoaled, extra allowance for a stronger current should be made.

**Tonki Cape**, the northeastern end of Afognak Island, is a narrow grass-covered point 87 feet high near its northern extremity. A low-lying gap connects it with the ridge separating Tonki Bay and Marmot Strait. A short reef extends northward from the cape 0.3 mile, terminating in a rock awash at high water. It is recommended that vessels clear the north end of the cape by at least 1.5 miles. **Tonki Cape Light** ( $58^{\circ}21.2' N.$ ,  $151^{\circ}59.1' W.$ ), 75 feet above the water, is shown from a small white house.

**Sealion Rocks** lie 5.5 miles eastward from Tonki Cape and 4 miles northward from Marmot Island. They are two bare rocks close together, the larger one being about 15 feet high. A reef, which uncovers 7 feet, lies 0.6 mile northeastward from these bare rocks. Sealion Rocks have been used as a bombing target.

**Marmot Island**, about 6.5 miles long, parallels the east side of Afognak Island. Marmot Island is wooded to a height of about 500 feet. The north end is low and rises gradually to the highland. The eastern side and southern end of the island are bluffs over 1,000 feet high in places. The western shore is also steep but lower. Three high points are close to Marmot Cape, the south end of the island, and two more are close to its southeast side.

Shoal areas adjacent to the northwest shore of Marmot Island extend northward toward Sealion Rocks and border the north approach to Marmot Strait. A 4-fathom shoal in this area lies 2 miles off the north end of Marmot Island.

A point on the northwest shore of Marmot Island, 1.5 miles from the north end, is marked by a rock, 12 feet high, 600 yards offshore.

Two covered rocks, on which the sea generally breaks, lie about 1 mile apart and 2.5 miles eastward of **Cape St. Hermogenes**, the eastern end of Marmot Island. The northern rock lies in the bearing  $288^{\circ}$  to the northern end of the island. The southern rock lies in the bearing  $225^{\circ}$  to the southeastern end of the island. Two pinnacle rocks close to the southeast side of Marmot Island bear  $232^{\circ}$  when in range—the range passes southeastward of both breakers. A vessel should pass over 2 miles outside the breakers to avoid broken bottom.

**Marmot Strait**, between Afognak and Marmot Islands, is 2.5 miles wide at its narrowest part. The strait is apparently free from dangers except along the shores. A shoal of  $1\frac{1}{4}$  fathoms lies 650 yards off the western shore of Marmot Strait, 6 miles from Tonki Cape. A midchannel course through the strait is recommended. Tidal currents have an estimated velocity of 1 to 3 knots, the flood setting northward through the strait.

**King Cove**, 6 miles west of Marmot Cape, is an open bight 1.5 miles long, indenting the coast 1.8 miles. It may be used as a temporary anchorage in 7 to 12 fathoms, sand bottom. It is exposed to easterly and southerly weather.

The west coast of Marmot Strait for about 5 miles southward from Tonki Cape is broken and rocky, with reefs extending offshore. Along this stretch is a low bluff with a grass- and muskeg-covered plain, extending 0.3 mile inland to the main ridge which rises abruptly. Southward to King Cove the bluffs increase in height with the shores steep-to. From King Cove to Pillar Cape the shoreline is a steep, bare bluff from 500 to 1,000 feet high.

**Chart 8534.**—Marmot Bay extends westward between Afognak and Kodiak Islands to Whale Island. In the center of the bay, near the entrance and northward of The Triplets, in places the bottom rises abruptly from deep water to 14 to 18 fathoms. These areas should be avoided because there may be less water than indicated.

The route from Marmot Strait to Kodiak is eastward of the broken bottom in the center of Marmot Bay entrance. However, shoal spots exist along this route eastward of Spruce Island and in the vicinity of Spruce Cape.

The route in Marmot Bay from the vicinity of Marmot Strait to the passes at Whale Island lies between the general broken ground in the center of the bay and the north shore. Pillar Cape may be rounded at 1.5 miles in depths of 20 fathoms or more. Similar depths exist 0.8 mile off Cape Izhut. In the western end of Marmot Bay danger will be avoided by keeping well eastward of a line between the eastern end of Cape Kostromitinof and Stripe Rock, and eastward of this line extended southward until Hog Island is open from the northwestern side of Whale Island.

The route along the south side of Marmot Bay through Narrow Strait and Whale Passage is generally used by vessels from Kodiak bound for Shelikof Strait. Passage at the time of maximum current in Whale Passage should be avoided. Current predictions for Whale Passage may be obtained from the Tidal Current Tables.

**Pillar Cape**, the outer end of the north shore of Marmot

Bay, is a bluff over 500 feet high, similar to the southeast side of Marmot Island. A high pinnacle rock is at the foot of the bluff 0.5 mile eastward of the south end of the cape. About 1.5 miles westward of the cape is an open bight from which lowland extends through to the western arm of Tonki Bay.

**Izhut Bay**, a northern arm of Marmot Bay, opens with a width of 5 miles between Pillar Cape and Peril Cape and extends about 7.5 miles in a northwest direction. The only dangers are along the shores and in the arms of the bay. The bay proper is exposed to southerly weather, but some of the arms afford protected anchorages.

The most important of these anchorages is **Kitoi Bay**, an arm on the west side. Its head is a landlocked basin about 0.5 mile in diameter. The swinging radius from the center of the basin is about 300 yards. To enter Kitoi Bay pass the north entrance point of this arm slightly less than 0.5 mile off on a course **305°**, picking up the range defined by the prominent point on the north side about 1.8 miles in and the stream at the head of the small bight at the head of the arm. Continue on course or range until 0.3 mile from **Midarm Island**, a small prominent midbay islet, 50 feet high. This position is between another islet 600 yards to starboard and a 3-fathom spot 125 yards to port. The islet on the starboard beam lies 100 yards from the north shore. The 3-fathom spot is marked by only a few streamers of kelp which are difficult to see. Then change course to pass southward of the islet and steer midchannel course to the center of the basin which is clear to within a few yards from shore. A low-water spit extends a few yards off the north entrance point of the basin. Anchor in 20 to 22 fathoms, good holding ground. Small vessels may anchor in a small bight southwest of the basin in 11 to 12 fathoms.

Two fingerlike arms in the northeast part of Izhut Bay extend northward about 5 miles. **Suposa Bay**, the easterly arm, has an island about 0.5 mile from its entrance. A rock, covered  $\frac{3}{4}$  fathom, lies about 125 yards south of the island. The passage is west of the island. The controlling depth is 2 fathoms. Small vessels may anchor above the island in 7 to 10 fathoms, sand bottom. The westerly arm is not recommended as an anchorage.

**Peril Cape**, the outer end of the western shore of Izhut Bay, is a prominent precipitous headland about 600 feet high with a high pinnacle rock close to its southern side.

**Cape Izhut**, 2.5 miles southwestward of Peril Cape, is a projecting, long, wooded, hilly point from 250 to 500 feet high. There is deep water around the cape as close as 0.3 mile.

**Duck Bay** is about 6 miles long from Cape Izhut to Cape Kostromitinof. At the eastern end of the bay temporary anchorage, with a swinging radius of about 300 yards, may be had in the middle of the cove 1.5 miles northwestward of Cape Izhut, in 6 to 7 fathoms. The anchorage is eastward of an islet, 16 feet high, which lies 0.3 mile from the northern shore and should not be approached closely. **Selezen Point** forms the western side of the cove.

A round, rocky island, 163 feet high and grass covered on top, lies 2.5 miles westward from Cape Izhut and 0.6 mile from shore. Kelp extends nearly 0.3 mile westward

and northward of the island, and numerous bare rocks extend 0.5 mile eastward of the island and to the shore northeastward of it. On **Selezen Bay**, the cove northward of the island, is the small native settlement of **Little Afognak**. Temporary anchorage may be had in the middle of the cove in 10 to 12 fathoms. Enter the cove westward of the island between the island and a large rock awash at high water, which lies 0.3 mile southward from the western point of the cove.

**Mary Anderson Cove**, the next cove westward, with its entrance 1 mile northwestward of the 163-foot island, is 1 mile long and 0.7 mile wide. The bottom is rocky and kelp extends some distance from shore in places. Small craft entering with care can anchor in 5 to 8 feet at the head.

**Cape Kostromitinof**, on the northern shore of Marmot Bay, is a projecting, long, level, wooded point, about 200 feet high, with bluffs in places at the water. Northward from the cape the land rises gradually in a distance of 5.5 miles to **Duck Mountain**, a prominent peak, 2,080 feet high.

**Kazakof Bay** extends about 6 miles in a northerly direction from the northwestern part of Marmot Bay. Anchorage for vessels of any size is found at the head of the bay, see Routes, Kazakof Bay.

The cove on the eastern side, 3.5 miles above the entrance to Kazakof Bay, affords shelter for a small vessel anchored in 12 to 14 fathoms. Small craft can anchor in the southeastern end of the cove in about 5 fathoms. A reef extends about 100 yards off the south side of the entrance. The small bight in the eastern shore is shoal.

**Parrot Islet**, round, rocky, and 70 feet high, is in the entrance to Kazakof Bay. Channels for entering lie on either side of the broken ground on which Parrot and other rocky islets and rocks awash are grouped. A sunken ledge with some kelp and a depth of  $3\frac{1}{2}$  fathoms lies about 0.8 to 1.5 miles southeastward of Parrot Islet; its northern end lies 0.5 mile off Cape Kostromitinof.

**Stripe Rock**, 2.8 miles southward of Parrot Islet, is marked by a prominent white streak which extends along the entire height of the rock. It is composed of two pinnacles close together, about 35 feet high; the white streak is on the higher of the two pinnacles. A large bare ledge, 30 feet high, lies between Stripe Rock and Parrot Islet.

Westward of Stripe Rock and the large bare ledge, the area extending to the shore is mostly foul and should be avoided by vessels.

**Routes, Kazakof Bay.**—From eastward, shape the course for a position about 0.5 mile southeastward of Cape Kostromitinof. Head for Parrot Islet on a **305°** course until the southwestern end of the cape is a little forward of the beam. Change to **330°** and pass 0.25 mile off the southwestern end of the cape and the same distance northeastward of Parrot Islet.

Then steer **359°**, with Parrot Islet astern, to the head of the bay. Above Parrot Islet the only danger, if the shores are given a berth of 0.3 mile, is a low, bare rock lying 0.4 mile from the eastern shore and 0.6 mile from

the head of the bay. The anchorage is about midway between this rock and the point separating the two arms at the head of Kazakof Bay, in 14 to 15 fathoms, muddy bottom. Small vessels can anchor in 8 to 10 fathoms, either in the broadest part of the western arm 0.3 mile from its head or in the entrance of the eastern arm.

From southwestward, keep Hog Island open from the northwestern side of Whale Island until Stripe Rock is in range with the eastern side of Cape Kostromitinof. Then steer  $041^{\circ}$  for 2.3 miles to a position 0.25 mile eastward of Stripe Rock. Then steer  $006^{\circ}$  for 1.1 miles to a position 0.25 mile eastward of a bare ledge about 30 feet high. Then steer  $333^{\circ}$  about a mile. Then steer  $358^{\circ}$  for 0.8 mile, keeping Stripe Rock open westward of the bare ledge astern until Parrot Islet is 0.5 mile on the starboard beam. From this position a  $005^{\circ}$  course will lead to the head of the bay.

**Afognak Bay**, western tributary to Marmot Bay, makes into Afognak Island about 3.5 miles. There is secure anchorage off an abandoned cannery at **Rivermouth Point**, near the head; see Routes, Afognak Bay. **Litnik** is a small village on **Afognak River** at the head of the bay.

Afognak Bay may be entered easily in the daytime. The approach from Marmot Bay is through **Eastern Passage**, between Ilog Island and Big Rock, which lie off Afognak Bay. This approach is endangered by a rock awash at low water and steep-to, lying 0.6 mile southeastward of Big Rock. Foul ground marked by kelp extends about 350 yards from Hog Island into Eastern Passage, and shoal water hinders the passage in the vicinity of Big Rock.

A straight channel, bordered by dangers, leads from Eastern Passage to the central part of Afognak Bay. On the northeast side of the channel are the Skipwith Reefs, with shoal water projecting channelward. On the southwest side are **Danger Reef**, which uncovers about 5 feet; a  $3\frac{1}{4}$ -fathom shoal 0.9 mile southeastward of the reef, and a rock covered  $2\frac{1}{4}$  fathoms lies 0.6 mile northwestward of Danger Reef.

**Hog Island**, the prominent mark for approaching Afognak Bay and also Afognak Strait, is 0.4 mile long and has two wooded knolls with a saddle in between.

**Big Rock**, 1 mile from Ilog Island with Eastern Passage between, is comparatively narrow, irregular, and 100 yards long in a north and south direction.

**Skipwith Reefs**, a chain of bare rocks and reefs, extend 1.5 miles northwestward from Big Rock to Lamb Island. The southeastern side of the rocks should be given a berth of over 0.4 mile.

**Lamb Island**, 0.5 mile long and wooded, is near the point which marks the outer end of the eastern shore of Afognak Bay. Between this point and the rock awash at low water, 0.6 mile off Big Rock, the entire area is obstructed and should be avoided.

**Alexander Island**, 0.8 mile eastward of Lamb Island, is grass covered and has a knob about 80 feet high at its north end. Foul ground surrounds the island and extends 1.2 miles toward Stripe Rock.

**Dot Island**, small and wooded, is the westernmost of three small islands close to **Posliedni Point**, where

Afognak Bay narrows to 0.5 mile. On the western shore opposite Dot Island is a cascade where fresh water can be obtained by boat.

**Graveyard Point** marks the outer end of the western shore of Afognak Bay. **Lipsett Point** is the next point inside the bay. **Aleut Village** is on the shore of the bight between these points.

**Village Reefs**, partly bare at low water and covered with kelp, extend over 1 mile eastward from the shore around Graveyard Point toward Hog Island. The point of the reefs is midway between Graveyard Point and Ilog Island. Southeastward from the point of the reefs is a detached shoal with a least found depth of  $3\frac{1}{2}$  fathoms. Between this shoal and the reef extending 650 yards westward from Ilog Island is a channel 0.5 mile wide. The channel is sometimes used by vessels, with local knowledge, to enter Afognak Bay from Afognak Strait.

**Head Point** is 1.4 miles southward of Graveyard Point and between these points is the village of **Afognak** (1900 population 190; P.O.). The white church with green roof, 0.3 mile southward of Graveyard Point, is the best mark in the village. Afognak has two sawmills. Regular passenger steamers do not call at Afognak; the mail is brought from Kodiak.

Small vessels can anchor in 5 fathoms near the kelp on Village Reefs, with the church in Afognak bearing  $344^{\circ}$  and Head Point in line with Deranof Rock. Little current will be felt here, but there is exposure to easterly winds.

For tides, see Afognak Strait.

**Routes, Afognak Bay.**—From northeastward, keep Ilog Island open from the northwestern side of Whale Island, bearing anything westward of  $250^{\circ}$ ; this range will lead about 0.3 mile southeastward of the rock awash, which lies 0.6 mile off Big Rock. When Big Rock appears in range with the eastern end of Lamb Island turn to pass midway between Big Rock and Hog Island, and steer  $315^{\circ}$  for the old cannery building at Rivermouth Point, showing midway between Dot Island and Posliedni Point. Keep this range for about 2 miles until the western end of Lamb Island is abeam. Then steer  $308^{\circ}$  for 1.8 miles and pass 400 to 500 yards southward of Dot Island.

Keep this course for about 0.3 mile past Dot Island until 0.25 mile off the cascade on the western shore. Then steer  $353^{\circ}$  for 0.8 mile, favoring slightly the western shore. Anchor near midchannel off the old cannery at Rivermouth Point in 8 to 10 fathoms. The anchorage is clear if **Winter Island**, in the west arm, is given a clearance of 300 yards and **Last Point**, on the north shore, 400 yards.

From southward steer  $359^{\circ}$ , with Big Rock and the southwestern end of Alexander Island on range ahead, to pass eastward of Hog Island. When the northern tangent of Hog Island is abeam, turn from the range to pass midway between Big Rock and Hog Island.

**Whale Island**, at the western end of Marmot Bay, is about 4 miles in diameter. Its southern half is a grass-covered mountain, 1,080 feet high, with a narrow light streak down its eastern slope. The northern side of the

island is low, and the lower parts of the island are generally wooded. **Treeless Islet**, rocky and grass covered, lies 0.4 mile off the eastern side of the northern end of the island. Whale Passage is southward of the island, and Afognak Strait, northward.

**Afognak Strait**, between Whale and Afognak Islands, is used mostly by small vessels.

The currents are only half as strong as in Whale Passage. The dangers are marked by kelp, which grows in depths up to about 6 fathoms and shows at slack water.

If precaution is taken, the navigation is not difficult on a clear day when the marks for the strait can be seen, and when the summit of Kupreanof Mountain is not hidden. The range formed by this mountain peak and Deranof Rock, off Deranof Island, effectively marks the channel through Afognak Strait, except in the central part of the strait and just inside the western entrance. In the central part of the strait the range passes close to the edge of foul ground making out from the north shore; here a vessel should guard against going anything northward of the range. Just outside the western entrance, a 2½-fathom depth on a rock lying 600 yards from the Whale Island shore is on or a very little northward of the range. The channel is just southward of the rock, and here it is necessary to deviate a little southward of the range to avoid the rock; the channel is only 300 yards wide between the 2½-fathom rock and the reef making out from Chiachi Point; the general depth is 24 feet.

A reef awash at low water lies 0.4 mile north-northwestward from Chiachi Point or 400 yards northward of Kupreanof Mountain-Deranof Rock range.

Most of the northern half of Afognak Strait is foul. Southwestward of Head Point the foul ground extends 0.3 mile offshore and its southern edge is near the Kupreanof Mountain-Deranof Rock range.

**Dolphin Point** is the northeast end of Whale Island. A reef partly bare at low water extends 600 yards from Whale Island at a point 0.3 mile westward of Dolphin Point.

**Fox Bay**, the bight in Whale Island 1 mile westward of Dolphin Point, has in its entrance a reef which uncovers at low water. A small vessel can anchor in the bay inside the reef in 4 to 5 fathoms, but the south shore must be given a berth of 300 yards.

Westward of Fox Bay the shore of Whale Island is clear to **Chiachi Point**, the northwest end of the island, from which a shelving reef makes out about 350 yards in a northwest direction.

Temporary anchorage may be had in the channel of Afognak Strait between Fox Bay and Afognak village, in 7 to 8 fathoms, but exposed to the full strength of the currents and to easterly and northerly winds.

A good anchorage in Afognak Strait, but exposed to easterly weather, can be had in 5 to 7 fathoms about 400 yards off a gravel beach on the southeast end of Little Raspberry Island. The bottom is sand and gravel and the anchorage is suitable for large or small vessels. To make

this anchorage from the east hold a **270°** course with the south end of Little Raspberry Island ahead. The end of this island can be recognized as the north side of the passage northward of Deranof Island. Remain on the bearing **270°** on the south end of Little Raspberry Island in order to avoid foul ground off Shoal Point and to avoid a rock south of this course which uncovers 1 foot. This rock is marked by kelp which shows under at most stages of the tide. If this course is used coming into this anchorage, or for small vessels in The Narrows, it is possible to select a good range for this course, with the south tip of Little Raspberry Island against the slope of a mountain on Raspberry Island near Last Timber Point.

With easterly winds small vessels can anchor about 0.3 mile westward of **Afognak Point**, on the north side of Afognak Strait, 0.8 mile westward of Head Point, in about 4 fathoms; but caution is required. When rounding into the anchorage, pass northeastward of a reef, bare at low water, lying 0.4 mile southwestward of the point; give the point a berth of over 300 yards.

**Deranof Island**, 0.5 mile long, low and wooded, is the southernmost and largest of the islands at the western end of Afognak Strait.

**Deranof Rock**, about 15 feet high, lies nearly 200 yards southward of the island. Broken ground with a least depth of 2½ fathoms lies 0.4 mile eastward of the island and **074°** from Deranof Rock.

**Tides, Afognak Strait.**—High and low water occur about ½ hour later than at Kodiak. The diurnal range of tide is about 10 feet.

The **tidal currents** in Afognak Strait set westward on the flood and eastward on the ebb. The estimated velocity is 2 to 5 knots at strength, depending on the range of the tide. During the flood there is a strong set into Raspberry Strait; this should be kept in mind when in the western end of Afognak Strait.

**Routes, Afognak Strait.**—From eastward in Marmot Bay, keep Hog Island open from the northwest side of Whale Island, bearing anything westward of **250°**; and pass 0.25 mile or more southward of Hog Island and 0.5 mile northward of Dolphin Point.

Passing 0.5 mile northwest of Dolphin Point, steer for Deranof Rock in range with the summit of Kupreanof Mountain; or if the mountain is obscured, steer for Deranof Rock with the southern end of Hog Island astern, course **253°**. Off Head Point and for 0.8 mile to the westward, go nothing northward of the range. When approaching the western end of the strait, keep a little southward of the range to avoid the rock with 2½ fathoms over it; but give the shore of Whale Island a berth of over 300 yards; on the flood guard against a northerly set toward Raspberry Strait.

When the eastern one of the two highest peaks on the southern side of Whale Passage opens westward of Whale Island, bearing **184°**, steer **238°** and pass 0.25 mile south-eastward of Deranof Rock. Continue the course 0.8 mile past the rock, and then steer **286°** with the summit of

Whale Island astern. This course made good will lead through Kupreanof Strait, passing 0.4 to 0.5 mile southward of Gori Point, 0.9 mile northward of Outlet Cape, and 0.5 mile southward of Malina Point.

Raspberry Strait is described later in this chapter.

**Raspberry Island**, extending from Shelikof Strait to Afognak Strait, is about 15 miles long in a northwest and southeast direction, and averages about 5 miles in width. On the northeast side it is separated from Afognak Island by Raspberry Strait, and Kupreanof Strait borders its southwest side. This island is rugged and mountainous with elevations up to 2,345 feet. Most of the shores are bold and precipitous except where numerous valleys meet the shore. The island is grass-covered except along the Shelikof Strait side, where it is for the most part bare sheer cliffs, and along the southeastern half of Raspberry Strait where the island is heavily covered with spruce.

The description of features along the various shores of this island is given in connection with the information pertaining to Kupreanof, Raspberry, and Shelikof Straits.

**Whale Passage**, southward of Whale Island, joins Kupreanof Strait to form a part of the main route between Kodiak and Shelikof Strait. The islands bordering both sides of Kupreanof Strait are grass covered and mountainous, especially the north shore which rises abruptly. The timber extends westward along the shore to Last Timber Point and Dry Spruce Island, where it terminates except for scattered clumps. Navigation in the daytime is not difficult when the current is not too strong; however, careful attention to steering is required under any condition.

**Ilkognak Rock Light** ( $57^{\circ}54.9' \text{ N.}, 152^{\circ}46.9' \text{ W.}$ ), 15 feet above the water, is shown from a small white house on a square tower on concrete pier in the middle of the eastern entrance to Whale Passage. A ledge, covered  $2\frac{1}{4}$  fathoms, extends 0.4 mile eastward of the light, and a reef, covered  $1\frac{1}{4}$  fathoms, extends 0.2 mile southwestward of the light. Broken ground with a detached rock, covered 3 fathoms, is 0.3 mile northeastward of the light; with strong ebb current, heavy swirls and overfalls occur in the wake of this broken ground, and dangerous tide rips prevail at such times with northeasterly gales. A rock, awash at high water, is near Whale Island, 0.4 mile northward of the light.

**Shag Rocks**, 0.4 mile southwestward of Ilkognak Rock Light, uncover about 5 feet. A rock, covered  $2\frac{1}{2}$  fathoms, is 0.3 mile off Whale Island and 0.9 mile northwestward of the light; heavy swirls and eddies occur in the vicinity.

**Koniuji Islet**, 0.3 mile from the south side of Whale Passage and 2 miles northwestward of Ilkognak Rock Light, is 40 feet high and grass covered; a buoy marks the channel on the north side of the islet. Kelp extends 1 mile and broken ground 0.8 mile westward from the islet. Koniuji Islet should be given a good berth on the north side as the current sets toward it at times.

**Kupreanof Strait**, 1.8 to 3 miles wide, is clear in mid-channel but several shoal spots must be avoided.

**Chernof Point**, on the south shore of Kupreanof Strait, 5.3 miles westward of Ilkognak Rock Light, is low and wooded but prominent. A ledge of rock about 150 feet long and 50 feet wide, 0.6 mile westward of the point and 0.2 mile offshore, uncovers about 5 feet; it is marked by heavy kelp. **Ostrovka Point**, 2 miles westward of Chernof Point, is low and wooded; a high grassy islet is close to.

Broken ground, covered  $4\frac{1}{2}$  to 10 fathoms, extends 4.5 miles northwestward from Chernof Point up to 0.8 mile off Ostrovka Point and Dry Spruce Island.

**Last Timber Point Light** ( $57^{\circ}58.6' \text{ N.}, 152^{\circ}59.3' \text{ W.}$ ), 35 feet above the water, is shown from a small white house on the point on the north side of Kupreanof Strait, 7.4 miles northwestward of Ilkognak Rock Light. **Thomas Rock**, 1.5 miles southeastward of Last Timber Point Light, is awash at low water; a patch, covered 6 fathoms, is 0.3 mile southwestward of the rock.

**Gori Point**, 2.5 miles westward of Last Timber Point Light, is the base of an abrupt sloping ridge with its summits close to the shore.

**Kupreanof Mountain**, on Kupreanof Peninsula 10 miles westward of Ilkognak Rock Light, is 2,420 feet high and consists of prominent broken gray rock.

**Dry Spruce Island**, on the south side of Kupreanof Strait 8.5 miles westward of Ilkognak Rock Light, is 225 feet high and wooded. **Dry Spruce Island Rock Light** ( $57^{\circ}57.9' \text{ N.}, 153^{\circ}04.1' \text{ W.}$ ), 20 feet above the water, is shown from a white post with white daymark off the western end of the island on a ledge which uncovers about 6 feet. Two grassy islets and a pinnacle rock are off the north side of the western end of the island.

A small wooded island and shoals, dry at low water, are between Dry Spruce Island and **Drying Point**, the end of the mainland on the north side of Dry Spruce Bay.

**Bare Island**, just westward of Dry Spruce Island, is partly wooded on its eastern half. **Dry Spruce Bay Light** ( $57^{\circ}57.3' \text{ N.}, 153^{\circ}06.5' \text{ W.}$ ), 76 feet above the water, is shown from a small white house on a small grassy island 0.4 mile westward of Bare Island.

**Anchorage**.—Temporary anchorage can be had in the bight on the north side of Whale Passage if stopped by too strong a flood current in the passage eastward. There is an eddy current in the bight, and care should be taken to get in far enough to ride to the eddy alone. A good place is in 8 fathoms, 300 yards from Whale Island, with Koniuji Islet bearing about  $238^{\circ}$ .

A better anchorage can be had 0.3 to 0.4 mile off the western side of Whale Island, in 8 to 10 fathoms. This is convenient to either Whale Passage or Afognak Strait, and is well out of the current; the anchorage is exposed to westerly winds.

Anchorage may be had in places near the shore of Kupreanof Peninsula, but the only secure harbor is Dry Spruce Bay.

**Tides and currents**.—Passage through Whale Passage at times of maximum current should be avoided. The tidal currents in Whale Passage set westward on the flood and eastward on the ebb. During large tides, the



currents are very strong with boils and swirls. The current velocity is about 4.5 knots. See the Tidal Current Tables for predictions.

The tidal currents at Kupreanof Strait have an estimated velocity of 2 to 3 knots during large tides. At the west end of Kupreanof Strait near Onion Bay, high and low water occur about the same time as at Seldovia. The diurnal range is 14.4 feet. The tides meet in the strait a little westward of Dry Spruce Island.

**Routes.**—Enter Whale Passage on a  $262^{\circ}$  course from Kizhuyak Bay, passing close southward of the buoy off **Yuzhni Point** and 0.25 mile northward of Ilkognak Rock Light. When Ilkognak Rock Light bears  $118^{\circ}$ , distant 0.5 mile, and **Inner Point** bears  $180^{\circ}$ , change course to  $298^{\circ}$ . Gori Point open a little southward of the south end of Koniui Islet heads southward of the  $2\frac{1}{2}$ -fathom rock. When **Uzkosti Point** bears  $023^{\circ}$ , distant 0.3 mile, change course to  $317^{\circ}$  until 0.3 mile north of Koniui Islet, then change to course  $292^{\circ}$  until 0.4 mile off Gori Point where a  $286^{\circ}$  course will lead into Shelikof Strait, passing 0.5 mile southward of Malina Point Light. This route passes 0.5 mile northward of a buoyed  $2\frac{1}{2}$ -fathom shoal, 3.9 miles westward of Gori Point.

Some of the courses are at an angle with the axis of the current; natural ranges should be used to aid in maintaining the courses.

**Dry Spruce Bay**, on the north side of Kodiak Island and on the south side of Kupreanof Strait, may be entered on either side of Bare Island.

Approaching Dry Spruce Bay from eastward, give Dry Spruce Island a berth of 0.8 mile and steer for the western end of Bare Island on any bearing southward of  $226^{\circ}$  until past Dry Spruce Island Rock Light; then haul eastward and pass midway between Dry Spruce and Bare Islands, course about  $139^{\circ}$ . This route is contracted to a 400-yard width by a low-water rock which lies 200 yards from shore inside the west end of Dry Spruce Island. Shoal water extends from the eastern end of Bare Island.

In approaching Dry Spruce Bay westward of Bare Island, care is necessary to avoid the foul ground extending over 0.2 mile from the south shore of Kupreanof Strait, 1.8 miles westward of Bare Island.

Port Bailey cannery and wharf are located on the south shore of Dry Spruce Bay opposite Dry Spruce Island. The face of the wharf is 150 feet long and has a depth of about 27 feet alongside. Fresh water, diesel oil, fuel oil, gasoline, some supplies, and a machine shop of a cannery are available. The cannery maintains radio-telephone and radiotelegraph communications with the Alaska Communication System. Unlighted mooring dolphins are along the shore southeastward of the cannery.

The best anchorage for large vessels is about 0.5 mile eastward of Bare Island and 0.4 mile off the cove in Dry Spruce Island, in 16 to 19 fathoms. A small vessel can anchor in the middle of the entrance to this cove in about 6 fathoms, taking care to keep clear of the flat, which extends 250 yards from its northeast side, and the unlighted mooring dolphins across the entrance to the cove. With strong southwesterly winds, some williwaws are

felt from Kupreanof Mountain. A midbay rock, which uncovers, is 0.8 mile from the head of Dry Spruce Bay.

**Outlet Cape** is the western end of **Kupreanof Peninsula**, included between Kupreanof Strait and Viekada Bay. The cape has a steep slope to a peak, 1,620 feet high, eastward of which is a low divide. **Laida Rocks** are a cluster of bare rocks 350 yards off the northwest end of the cape.

Viekoda Bay is described later in this chapter.

**Onion Bay** makes into **Raspberry Island** about 2 miles, and from its head a low divide extends through to Shelikof Strait. The entrance is narrow, and just inside, the bay is blocked by shoals partly bare at low water, between which are narrow channels suitable only for small craft. The tidal currents have an estimated velocity of 3 to 5 knots in the entrance. Temporary anchorage can be had 0.4 to 0.5 mile off the entrance, in 10 to 15 fathoms.

**Malina Point Light** ( $58^{\circ}02.4' N.$ ,  $153^{\circ}21.8' W.$ ), 80 feet above the water, is shown from a small white house at the southern end of the mountainous headland on the southwestern part of Raspberry Island. The point itself is projecting and prominent. It has a grass-covered knoll at its end, with a low neck behind it, and then a steep slope to 1,500 feet.

During northeast weather, small craft can find excellent protection behind Malina Point.

**Raspberry Cape** is at the western end of the mountainous headland on the southwestern part of Raspberry Island. The cape is steep and high and has areas of bare rock. There are some bare rocks in the water close to the foot of the cape.

**Local magnetic disturbance.**—Differences of as much as  $3^{\circ}$  from normal variation have been observed in Kupreanof Strait about 0.4 mile south of Raspberry Cape.

**Kizhuyak Bay** is the continuation of Marmot Bay, and from Whale Island and Kizhuyak Point it extends southward for about 14 miles into Kodiak Island. The outer bay is exposed to northeast weather, and only at or near the head is protection afforded from seas sweeping in from Marmot Bay. A landlocked anchorage for small vessels is available in Anton Larsen Bay but local knowledge is required to navigate its narrow entrance channel. Sharatin Bay, another arm, is exposed to seas from the northeast.

A midchannel course in Kizhuyak Bay is clear of known dangers; however, a bank of 6 to 9 fathoms, irregular in outline and rocky in places, extends across the bay, 2 to 3 miles southward of Peregrebni Point. A somewhat similar bottom exists between opposite shores in the locality of the islet, 2.5 miles from the head. A small rock and a rock awash lie 300 yards westward of the islet.

**Peregrebni Point**, on the west side of Kizhuyak Bay, is on a wooded peninsula which is backed by **Seutler Cove**. The bottom of the cove, favoring the western shore, is sandy, and rises gradually from a depth of about 2 fathoms just inside the entrance to the mudflats at the head of the cove.

At Peregrebni Point the bay narrows to a width of 1.5 miles. The western shore from 1.2 to 4.5 miles southward of Peregrebni Point is foul; a rock bare at low

water, lies 2.3 miles southward of the point and 0.4 mile from the western shore.

A flat extends 0.5 mile from the head of Kizhuyak Bay, where there is a large valley. Vessels may anchor off this flat in 19 fathoms, mud bottom; the depths are regular and there is ample room.

**Kekur Point** marks the northern end of the eastern shore of the narrow part of Kizhuyak Bay. A rocky patch of 6 fathoms and probably less depth, lies 0.9 mile 032° from Kekur Point.

Between Kekur Point and Kizhuyak Point, the west shore of the outer bay is indented by **Sharatin Bay** and **Anton Larsen Bay**. The waters along the intervening shore between the two bays, from **Threepillar Point** to **Crag Point**, contain several sunken rocks about 0.3 to 0.4 mile from that shore; and a patch of broken ground with a depth of 9 fathoms, lies 1 mile offshore in Kizhuyak Bay. Off **Anton Larsen Bay** is a kelp patch with a depth of only 4 feet, 0.9 mile 006° from **Crag Point**.

**Sharatin Bay**, eastward of **Kekur Point**, has a small grass-covered islet near the center of the bay. A rock covered 4 feet is 400 yards northward of the islet. A rock that uncovers 9 feet lies 300 yards off the projecting point of the bay shore westward of the islet. A rock, covered 7 feet, lies nearly 0.5 mile north-northwestward of **Threepillar Point**. A tide flat extends 0.8 mile from the head of the bay.

**Anton Larsen Bay**, between the point 0.9 mile southward of Kizhuyak Point and **Crag Point**, has its entrance nearly blocked by islands; and only small craft can enter. A rock, covered 3 feet and marked by kelp, is about 0.5 mile northward of the outer entrance island northward of **Crag Point**. A reef, bare at minus tides, lies 260 yards 045° from **Crag Point**. The passage into the bay eastward of **Crag Point** and the two passages at the northern entrance are very narrow.

The northernmost passage into **Anton Larsen Bay** was used by a survey tender, 77 feet long and 8½ feet draft. The entrance to this passage is between the northernmost island in the bay entrance and the northern point of the bay. About 0.3 mile inside this entrance and about 130 yards from the mainland is a large rocky patch, part of which uncovers. The channel is southward of this rocky patch. At the narrowest part of this passage is a small, narrow islet which hugs and parallels the mainland. The survey indicates that the channel borders close along the outer side of the narrow islet and makes a slight turn around the west end of the islet. Opposite the west end of the islet, the southwest side of the channel is bordered by rocks. Extreme caution and local knowledge are necessary.

**Anton Larsen Bay** has a 3-mile stretch of water with an average width of 0.5 mile, extending in a southerly direction from the northern entrance passage. A rock, awash at high tide, is in the middle of this stretch, about 1 mile from the entrance passage. The channel lies between the rock and the shore westward of it. A vessel may anchor about 0.3 mile southward of the rock in about 15 fathoms.

**Kizhuyak Point** marks the outer end of the eastern side of Kizhuyak Bay. A 2¼-fathom depth in a kelp patch lies about 0.8 mile 210° from Kizhuyak Point.

The broad point 0.8 mile northeastward of Kizhuyak Point is partly wooded and terminates in white cliffs in places. A rock which uncovers about 4 feet lies 400 yards northward from this point. Shoal water extends 300 yards northward of the rock.

Between the broad point and **Shakmanof Point** is **Shakmanof Cove**. A rock covered 4 feet is near the center of this cove.

**Shakmanof Point**, on the southern side of **Marmot Bay** about 2 miles westward of the entrance to **Narrow Strait**, is prominent and heavily wooded. Some rocks uncover close to the point, and it should be given a berth of over 300 yards.

**Low Island Anchorage**, the cove between **Shakmanof Point** and **Low Island**, affords anchorage in suitable depths but it is exposed to northerly weather. Northerly winds in this locality are infrequent.

**Three Brothers**, 1.2 miles eastward of **Shakmanof Point**, is a kelp-marked reef 600 yards long and steep to on its western side. Parts of the reef uncover about 8 feet. Near its southwestern end are two rocks which uncover about 4 feet, and at its northeastern end is a rock which uncovers about 3 feet.

**Three Brothers Reef Light** (57°55.5' N., 152°33.1' W.), 32 feet above the water, and shown from a skeleton tower on a concrete pier, marks the southwesternmost rock awash. Kelp extends about 250 yards southward of the light toward **Low Island**.

**Low Island** lies in the middle of the bight on the southern shore of **Marmot Bay** between **Shakmanof Point** and the western entrance to **Narrow Strait**. It is grass covered, and about 40 feet high at its southern end. Near its northern end is a clump of trees.

Vessels cross the 7-fathom bank or bar about 0.3 mile north-northeastward of **Low Island**, bound to or from **Narrow Strait**. A range consisting of **Prokoda Islet Light** just open on the nearly vertical bluffs of **Uzinki Point** leads between a red buoy marking a sunken rock on the north side of the crossing and a black buoy marking a 3¼-fathom shoal on the south side of the crossing. A wire drag examination along the range reveals a clear depth of 30 feet. It is required, however, that no deviation from the range be made. The sunken rock is 800 yards from **Low Island** and has less than 14 feet over it. The 3¼-fathom shoal is at the end of a reef extending northward from **Low Island**. These dangers are marked by kelp.

The passage south of **Low Island** is blocked by shoals that bare at low tide.

**Narrow Strait** is described later in this chapter.

**Spruce Island**, on the south side of **Marmot Bay**, is about 6 miles long in an east and west direction. The island is rugged, with **Mount Herman**, 1,595 feet high 2 miles westward of **East Cape**. The lower elevations are in general heavily wooded, with a low wooded area 0.8 to 1 mile wide extending between the eastern shore of the