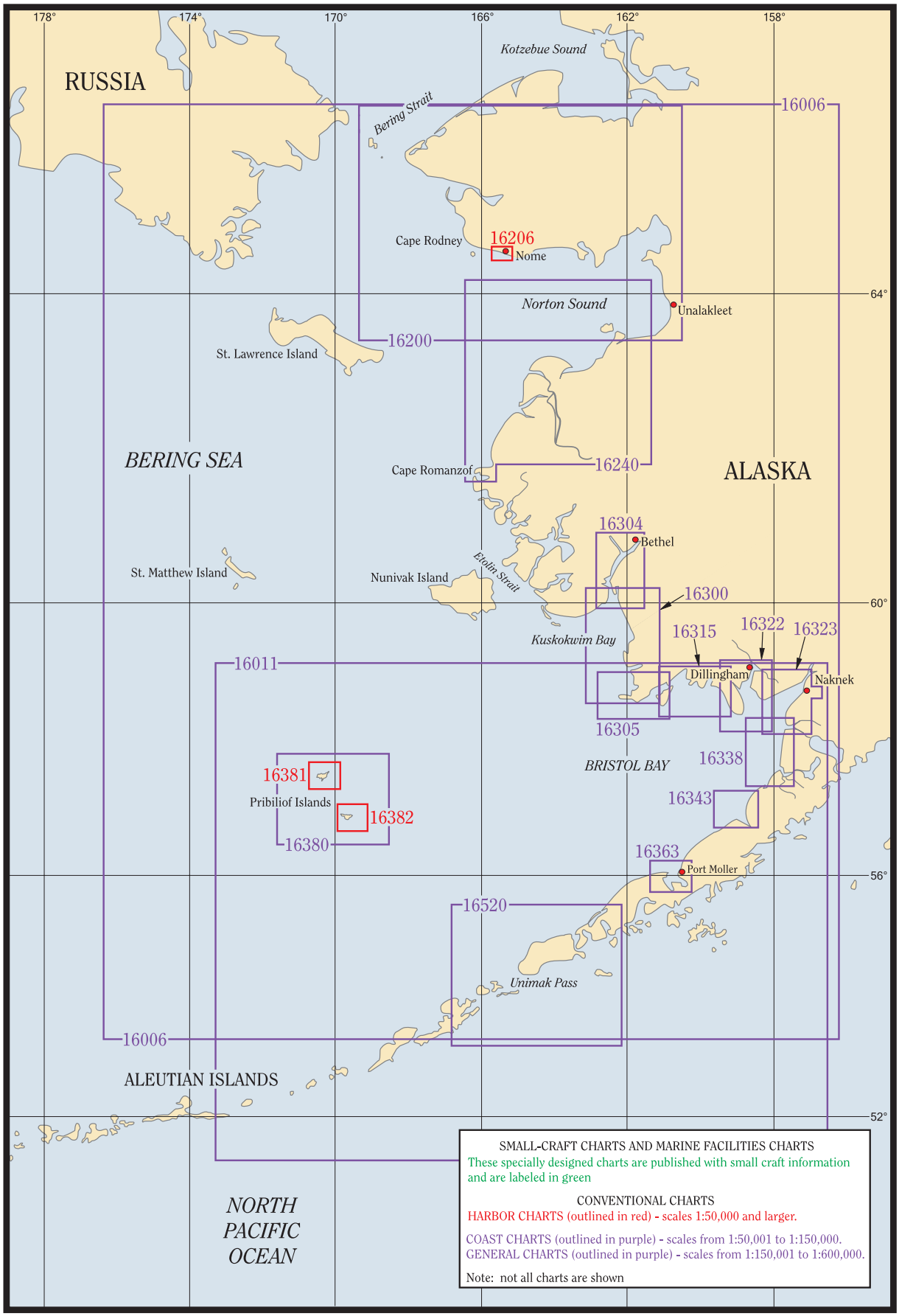
178°
174°
170°
166°
162°
158°
64°
60°
56°
52°
RUSSIA
Kotzebue Sound
Bering Strait
16006
Cape Rodney
16206
Nome
Norton Sound
Unalakleet
16200
St. Lawrence Island
BERING SEA
Cape Romanzof
16240
ALASKA
16304
Bethel
St. Matthew Island
Nunivak Island
Etolin Strait
16300
Kuskokwim Bay
16315
16322
16323
16011
Dillingham
Naknek
16305
BRISTOL BAY
16338
16381
Pribiliof Islands
16382
16343
16380
16363
Port Moller
16520
Unimak Pass
16006
ALEUTIAN ISLANDS
NORTH PACIFIC OCEAN
SMALL-CRAFT CHARTS AND MARINE FACILITIES CHARTS
These specially designed charts are published with small craft information and are labeled in green
CONVENTIONAL CHARTS
HARBOR CHARTS (outlined in red) - scales 1:50,000 and larger.
COAST CHARTS (outlined in purple) - scales from 1:50,001 to 1:150,000.
GENERAL CHARTS (outlined in purple) - scales from 1:150,001 to 1:600,000.
Note: not all charts are shown

Bering Sea

(1) This chapter describes the N coast of the Alaska Peninsula, the W coast of Alaska including Bristol Bay, Norton Sound, and the numerous bays indenting these areas. Also described are the Pribilof Islands, and Nunivak, St. Matthew, and St. Lawrence Islands. The communities of Nome, Unalakleet, Bethel, King Salmon, Naknek, Port Moller, and St. George are also discussed.

Chart 16006

(2) The S limit of the **Bering Sea** is a line running from Kabuch Point (54°49'N., 163°22'W.) on the Alaska Peninsula through the Aleutian Islands to the S extremes of the Komandorski Islands and on to Cape Kamchatka in such a way that all the narrow waters between Alaska and Kamchatka are included in the sea. The N limit is the Bering Strait.

(3) Much of this area has been only partially surveyed, and the charts must not be relied upon too closely, especially near shore. The currents are much influenced by the winds and are difficult to predict; dead reckoning is uncertain, and safety depends upon constant vigilance.

(4) The chapter area is entirely within the 100-fathom-depth curve, which extends NW from Unimak Pass and passes to the SW of the Pribilof Islands. Depths vary more or less uniformly in the open sea except near the off-lying islands, which are volcanic and rocky and range in height to more than 2,000 feet.

(5) From the head of Bristol Bay to Norton Sound, shoals or banks formed by river deposits extend many miles from the mainland, in some places completely out of sight. Kuskokwim and Yukon Rivers are the principal drainage systems along this stretch of coast. As fog and thick weather are common during the navigation season, coasting vessels are advised to sound constantly and to stay in depths greater than 10 fathoms unless feeling their way in to the land.

(6) Navigational aids are few, and all are seasonal. The rocky islands and the rocky parts of the mainland are frequented by thousands of birds whose constant cries may serve to indicate the approach to these places in thick weather. Port facilities are rare, and most of the villages scattered along the coast lighter their supplies from vessels anchored offshore. Good water can always be found in the vicinity of high land.

(7) The navigation season depends largely upon ice conditions, discussed later. During the winter, the ice and snow along the shore, as well as inland, are suitable for travel by dog team over many miles of established trail. Tractors could be driven over long stretches of this beach area when the lakes and protected bays are frozen solid enough to support them. Airplanes equipped with skis can also operate in winter from many points along the coastal and inland areas.

Currents

(8) Strong tidal currents flow through the Aleutian Islands passes, setting into the Bering Sea on the flood and into the North Pacific Ocean on the ebb. Observed velocities have exceeded 8 knots in some of the passes, but the decrease is rapid once the passes are cleared. The tidal currents set N and S along the Bering coast and into and out of the various bays. The periodic tidal flow along the coast is completely masked at times by wind currents. In constricted bays the currents may have considerable velocities. The tidal current has an average velocity of 0.5 to 1 knot at the off-lying islands.

(9) Most reports indicate that during the open season there is a general drift N along the Bering coast and thence through the Bering Strait into the Arctic Ocean. During the winter, ice moves from the Arctic into the Bering Sea. The N drift is probably not more than 0.5 knot in the open sea well N of the Aleutian passes. Wind and atmospheric pressure are said to materially affect the drift. In a disturbed area the current will generally set with a strong wind or toward an atmospheric depression, and such a current may serve as a storm warning.

(10) Along the N side of Unimak Island, the currents are fairly strong and generally parallel the coast. They attain a maximum velocity of 2 knots 1 mile off Cape Mordvinof and probably do not exceed 2.5 knots anywhere along this coast. Velocities have been estimated at 2 to 2.5 knots as far as 12 miles from shore in depths of about 40 fathoms.

(11) Between St. Matthew Island and Nunivak Island, the current sets NW with prevailing NE winds during the navigation season and NE with NW or SW winds. This N current continues and increases between St.

Lawrence Island and the mainland, being stronger toward the mainland N of the **Yukon River** where it has a velocity of about 1 knot except in early summer when the Yukon freshets may increase it to 2 knots or more. A strong N current, amounting at times to 2.5 knots, has been observed setting on the Yukon flats. The current sets N across Norton Sound to Sledge Island and is strongly marked along the coast between Sledge Island and Bering Strait.

(12) Captain Covell, of the Coast Guard Cutter BEAR, said of the currents in this area: "After a SE gale in the Bering Sea, during which the water is banked up against Siberia, a very marked current sets in the opposite direction. The reverse is true for a SW gale. The exact interval between the gale and the strong countercurrent is, so far, undetermined. Of the existence of this countercurrent under such conditions, there is no doubt, and it demands consideration."

Weather, Bering Sea

(13) The weather over the Bering Sea is generally bad and very changeable. Good weather is the exception, and it does not last long when it does occur. Wind shifts are both frequent and rapid. The summer season has much fog and considerable rain. In early winter, the gales increase, the fogs lessen, and snow is likely any time after mid-September. Winter is the time of almost continuous storminess. Heavy winds from any direction are usually accompanied by precipitation; however, the rain or snow that comes with east or south winds is likely to continue steadily until the wind shifts, while rain or snow squalls are characteristic of the west and north winds. Skies tend to clear more quickly with the slackening of the speed if the winds have been blowing from north or west directions.

(14) Taking the area as a whole, the winds are most frequent from N and NE directions from October through May and are variable, with predominating winds from directions in the S half of the compass at most stations during the period from June through September. The local topography, however, influences the prevailing wind so that the general wind circulation does not show conditions at the individual stations.

(15) Over Bristol Bay, winter winds blow mainly out of the N through E, while summer winds are more likely to come from the SW through NW. In winter, gales can be expected 5 to 10 percent of the time. At King Salmon, northerlies blow more than 20 percent of the time during the winter season, at average speeds of 10 to 12 knots. Calms occur about eight percent of the time. During June, July, and August, winds are out of the S through SW about 40 percent of the time, at average speeds of 8 to 10 knots. Gales occur less than one percent of the time in winter. The annual mean wind speed is about 10 knots.

(16) At Bethel, the head of ocean navigation on the Kuskokwim River, winter winds are out of the N through NE greater than 40 percent of the time; they blow at average speeds of 9 to 14 knots. Northwesterlies are also common from March through June, and then S through SW winds become predominant in midsummer; these summer winds average 10 to 12 knots. Gales at Bethel blow less than one percent of the time even in winter and are unheard of from April through August. However, winds reach 17 knots or more up to 20 percent of the time. At Hooper Bay, winds are frequently out of the northeast from November through February, but quite variable the rest of the year. St. Paul Island is more exposed than many locations along the coast. Here winter winds blow at 15 to 19 knots on the average, and gales can be expected about two percent of the time. Winds are variable, but mainly out of the N through E during this season. By midsummer, S through SW winds become prevalent, at average speeds of 10 to 12 knots. Northwesterlies are frequent during September and October. The annual mean wind speed is over 14 knots. The highest reported gust was 73 knots in September 1990. Winter winds are also strong in Norton Sound, where they blow at 28 knots or more on up to 13 days per month, at exposed locations like Unalakleet. Nome is more sheltered, and winds reach this speed on less than 4 days per month. At Nome, N through E winds prevail during the winter; calms are also common. Summer winds are more variable, but often blow out of the S through W. Maximum winds have reached 62 knots in December 1977. At Gambell, on the northernmost point of St. Lawrence Island, the prevailing winds are SW in summer and generally N through NE in winter. In general, S through SW winds are prevalent over the N Bering Sea in the midsummer.

(17) Most of the precipitation over Bristol Bay and the Bering Sea falls from July through October. Annual average amounts are 20 to 25 inches (508 to 635 mm) in Bristol Bay. It rains about 20 to 25 days per month during the peak period. Snow totals 40 to 60 inches (1016 to 1524 mm) per year on the average and is most likely from November through April. From Kuskokwim Bay to Norton Sound, precipitation drops off to about 10 to 17 inches (254 to 432 mm) annually; rain falls on 10 to 25 days per month in late summer. St. Paul Island has an average of nearly 24 inches (610 mm) during the year and extremes have ranged from 36.6 inches (930 mm) in 1964 to 9.82 inches (249 mm) in 1977. To the other extreme for the region, Nome has an average annual precipitation total of 15.79 inches (401 mm). Annual extremes for Nome range from 24.25 inches (616 mm) in 1950 to 7.42 inches (189 mm) in 1962. At

Bethel in August, it rains an average of 26 of the 31 days averaging about 3.5 inches (89 mm) for the month. Snowfall is much more uniform ranging from a maximum of 58.7 inches (1491 mm) in Nome to 46 inches (1168 mm) in King Salmon.

(18) Poor visibilities can be a problem all year around along the Bering Sea coast. Visibilities are restricted by land fog and snow in winter, and by sea fog and rain in summer. Sea fog is more frequent and more widespread. However, it does not drop visibilities below 0.5 mile any more frequently than land fog.

(19) In general, sea fog or haze drops visibilities to 7 miles or less on 13 to 20 days per month in midsummer. St. Paul Island is the most exposed, and fog or haze occurs here 22 to 29 days per month from May through August. At King Salmon, Bethel, and Nome, July and August are usually the worst months. Sea fog drops visibilities to 0.5 mile or below on about 2 to 5 days per month in summer. Snow and land fog during the winter restrict visibilities to less than 7 miles on about 8 to 12 days per month, and to less than 0.5 mile on about 2 to 5 days per month. Upriver ports like Bethel are the most vulnerable.

(20) There is a large continental influence in temperatures. Sheltered or inland ports get much colder in winter and much warmer in summer, compared to those exposed to the sea. St. Paul Island and Pilot Point are at about the same latitude. However, the average daily maximum in February is 27°F (-2.8°C) at St. Paul, compared to 11°F (-11.7°C) at Pilot Point, while average minimums are 18°F (-7.8°C) and -7°F (-21.7°C), respectively. At St. Paul, temperatures have dropped as low as -26°F (-32.2°C) in January 1919, compared to a -44°F (-42.2°C) at Pilot Point. In summer, the reverse is true. Pilot Point daytime readings are frequently in the low sixties (17° to 18°C) with an 84°F (28.9°C) extreme. At St. Paul Island, average daytime temperatures run in the upper forties to low fifties (8° to 12°C), with a 66°F (18.9°C) extreme (August 1987). Along the coast, midwinter daytime temperatures usually climb to 20°F (-6.7°C) in the south, and 10°F (-12.2°C) in the north and at upriver ports. At night, readings frequently drop below 0 F (<-18°C) at Bethel and Nome, while at King Salmon, 6°F (-14.4°C) readings are common. Extreme lows range from a -13°F (-25°C) at Port Heiden to a -55°F (-48.3°C) along the shores of Norton Sound. Significant warming takes place from March through May. Midsummer temperatures reach the mid-fifties to low sixties (12° to 17°C) during the day and drop to the mid-forties (6° to 8°C) at night. Extreme high temperatures have reached the low seventies to upper eighties (22° to 32°C). Highest temperatures occur at the more continental locations. Nome, Bethel, and King Salmon have each recorded all-time maximum temperature in the mid- to upper eighties (29° to 32°C) and extreme minimums approaching or surpassing -50°F (-45.5° C).

Ice

(21) Except in sheltered places the ice of the Bering Sea is in detached fields, floes, and cakes, which are continually kept in motion, breaking up, piling, and telescoping by the action of variable winds and currents. At no time is the sea one solid sheet of ice, and in the winter, when it is forming, the ice is more scattered than in the spring, when the N movement begins and packs it closer together. The general S limit of ice is from Bristol Bay to the vicinity of St. George Island, and thence about WNW to the Siberian shore. The S edge is ragged and very much scattered, and continued N winds sometimes drive fields of ice far S. As a rule, no heavy ice will be encountered S of the Pribilof Islands and the ice in their vicinity is likely to be nothing more than detached fields.

(22) In the spring, beginning with April, the ice has a general N movement, the shore clearing ahead of the center of the sea; but the ice sometimes hangs on in the bays and around the islands later than in the open sea. The movement and position of the ice depend greatly on the winds. Generally, by June 1, the whole body of ice is well up with St. Lawrence Island, and a passage opens to its W side. The E side of the sea is likely to be obstructed a little later than the W side, and ice is often met between St. Lawrence Island and Nunivak Island in the early part of June. The breaking out of the rivers in the latter part of May clears the shores, but the ice is likely to remain in Norton Sound several weeks later. In general, for a vessel not fitted to encounter ice, Norton Sound is not navigable before the middle of June. At the opening of navigation the ice is likely to be heaviest and to remain longest on the N shore of Norton Sound; in general it is the latter part of June before that part of the sound is altogether clear.

(23) In the fall young ice begins to form on the rivers, and in the bays and sheltered places in October, and grows stronger and spreads according to the severity of the advancing season. At Nome, on the N side of Norton Sound, navigation is difficult from early December to early June and is usually suspended from late December to mid-May.

(24) The National Weather Service publishes a Marine Weather Services Chart of Alaska waters which shows ice limits, forecast areas, and radio stations that transmit marine weather and additional information of interest to mariners.

Chart 16011

(25) **Bristol Bay** may be said to include all that part of the Bering Sea E of a line drawn from Cape Sarichef, Unimak Island, to the Kuskokwin River. Unimak Island and the Alaska Peninsula bound it on the S and E, and separate it from the Pacific Ocean. The Naknek River is at the head of deepwater navigation, while the bay itself terminates in the Kvichak River a few miles N. The region about Nushagak River, Kulukak Bay, and the Kuskokwim Bay forms its NW boundary.

(26) The shores are generally low and nondistinctive, but high mountain ranges and volcanic cones extend along the central parts of Unimak Island and the Alaska Peninsula. These rugged snow-covered mountains and lofty peaks would serve as unmistakable landmarks were they not obscured by the almost constant fogs that prevail during the summer. The shore and objects near sea level are often seen beneath the fog when the higher lands are obscured, and, therefore, most of the available landmarks are found on or near the beach.

(27) The Bristol Bay region must be regarded as a dangerous locality to navigate; it is only by the greatest vigilance and constant sounding that disaster can be avoided upon approaching the land. This is particularly true of the NE arms and approaches that receive the waters of the great salmon streams on which the Bering Sea canneries are located. The rivers discharge a great quantity of water into wide indentations which open on the arms of the great bay. The banks of the rivers are frequently marshy and generally muddy. The discolored waters of the rivers is charged with a large amount of sediment, which, when deposited forms shoal areas.

(28) The funnel-shaped configuration of the bay and river entrances creates tidal currents of great force, reaching, at times, velocities up to 6 knots. The diurnal range of tide averages about 18 feet at the river entrances. Vast areas of shoals uncover at low water, leaving only pools and narrow channels between them.

(29) In Bristol Bay and its tributaries, some lights and buoys are maintained by the Alaska Department of Fish and Game during the fishing season to mark fishing districts; they usually show quick flashing white lights and have no navigational significance. Marine lights and buoys are normally maintained only during the navigation season.

(30) Vessels operating in Bristol Bay, particularly at the head, are warned concerning the use of seawater as a cooling agent in internal combustion engines, heat exchangers, condensers, and evaporators. The heavy amount of silt in suspension in this area can do great damage to the machinery or equipment if overlooked. This is especially true of small diesel or gasoline engines with gear-type water pumps, since the fine sand will pack itself between the gears and cause them to bind. Also, the silt is likely to settle in various parts of the cooling system and accordingly the system may need regular flushing. Most small-boat operators in the salmon fishing area, such as Kvichak and Nushagak Bays, use freshwater cooling systems with piping led outboard.

(31) Reports of ice conditions at the head of Bristol Bay usually can be obtained from the National Weather Service Radio Weather Broadcast station at King Salmon near Naknek or the nearby canneries. On May 17, 1948, the survey ship PATHFINDER encountered floe ice about 20 miles NW of Port Heiden and a solid field of drift ice about 10 miles W of Egegik Bay. At this time of the year, the run from off Port Moller to the head of Bristol Bay should be made during daylight because of possible ice. In 1948, several commercial vessels encountered difficulties attempting the run at night.

Caution

(32) The State of Alaska has established a crab pot storage area in the Bering Sea between 57°00'N. to 58°00'N. and 164°00'W. to 166°00'W.

Danger zone

(33) A danger zone of an air-to-air weapon range is in the N part of Bristol Bay. (See **334.1280**, chapter 2, for limits and regulations.)

Chart 16520

(34) **Cape Sarichef** (54°36.0'N., 164°55.7'W.), described in chapter 7, the W end of the S coast of Bristol Bay, is low, with detached rocks close inshore, around which strong tidal currents sweep. The land falls away E in a gentle curve forming **Dublin Bay**, about 3 miles in depth and 16 miles across between the cape and Cave Point. This bay may be used as a temporary anchorage by vessels of any size. The holding ground is said to be good. From offshore the first 8 miles of this indentation is a smooth grassy slope gradually rising from low, rocky, grass-covered bluffs, about 60 to 100 feet high, to the mountains several miles inland.

(35) The beach is steep, and the surf breaks almost at the shoreline. The terrain leading back is quite rugged and is cut by numerous gullies. This part of the coast has several prominent hills ranging from 800 to 2,000 feet high at distances of 2 to 4 miles back from the shore. **Red Hill**, although only 798 feet high, is a very distinctive formation near Cape Sarichef; it is isolated and closer to the shore than the other peaks in the vicinity. The hill is easily recognized by its reddish hue

and is prominent from the N, NE, and W. It is often clear when higher peaks are obscured by fog or clouds.

(36) A large valley, appearing not as a pass but as an indentation into the hills, is easily recognized from offshore. **Beartrack Creek**, having a considerable drainage area, is a swift stream flowing through a bed strewn with small boulders. About 6 miles NE of Cape Sarichef are several waterfalls that may serve as landmarks for vessels close inshore.

(37) The coast in the N half of this moderate indentation is a series of low sand dunes, and the shore is sandy. From the line of dunes along the beach a large marshy area extends back for 2 or 3 miles, where a low pass begins and leads between the peaks to the S side of Unimak Island. Two moderate-sized streams and a number of small ones empty into the Bering Sea.

(38) SW of Cave Point the bottom is generally even, of fine black sand, and good holding ground; the 10-fathom curve is from 0.4 to 0.8 mile from the beach. There are no charted shoals of any consequence, although the 10-fathom curve is a little farther off the points than off the bights and coves. The best anchorage is in about 19 fathoms, 7.5 miles 048° from Cape Sarichef Light. This anchorage affords protection from the NE through the SE, and around to the SW. In N and NW weather the current may prevent a vessel at anchor from heading into the sea.

(39) **Cave Point** is a vertical rocky cliff formed by a ridge extending from the N side of Black Hill. It is named for a cave on its face inhabited by sea birds which in summer hover about it in the thousands, making it conspicuous in clear weather by their numbers and in fog by their constant cries.

(40) The point is very prominent and can be easily seen in clear weather from Cape Sarichef or from Cape Mordvinof. The water off Cave Point is deep; no shoals have been found. The 20-fathom curve runs about 1 mile off the point.

(41) **Black Hill**, a black-looking hill about 3 miles ESE from Cave Point, is the highest peak near the shore; it can be plainly seen from the W to the N. The hill is covered with snow in the winter, but is bare in the summer.

(42) Between Cave Point and Oksenof Point, the westernmost point of Cape Mordvinof, is another moderate indentation in the coastline about 6.5 miles by 0.8 mile in size. The shore for 4 miles NE of Cave Point is a sandy beach with a series of grass-covered dunes just back of the high-water line. From the line of dunes a large flat area extends back for several miles; in this area is a large pond which is about 0.5 mile NE of Cave Point. Between this pond and the hills forming Cape Mordvinof is a large swamp. One large stream empties into the sea at the N end of the sand beach. Offshore the bottom is even and no shoals of any importance have been found. The 20-fathom curve runs from 1 to 1.5 miles off the beach. The indentation in the coastline between Cave Point and Cape Mordvinof is a fair anchorage, giving some protection from the NE around to the S. In N and NW weather, currents affect the heading of an anchored vessel.

(43) Snow-clad **Pogromni Volcano**, 8.3 miles E of Cape Sarichef Light, forms a striking background to the low, monotonous coast. The top of the 4,040-foot peak, 1.9 miles N of Pogromni Volcano, is a ridge with no definite point. It is covered with snow most of the year and usually capped by clouds. However, at times, it is clear when Pogromni Volcano is not. On the NW slope of the volcano is a prominent arrowhead-shaped peak about 1,300 feet high. It is very prominent on the skyline from the N and NE, but is covered by clouds a great part of the time.

(44) **Cape Mordvinof**, 26 miles NE of Cape Sarichef, consists of a succession of points and coves at the end of a series of round-topped ridges separated by shallow valleys. The point, including **Oksenof Point**, is characterized by precipitous rocky bluffs ranging from 450 feet high on the W side of the cape down to 100 feet on the E end. Small clear streams run through the valleys, and the terrain slopes upward from the bluff line to a group of rocky peaks about 2,000 feet high. These peaks are snow covered in the winter and bare in the summer. The valleys and ridges are covered with grass and tundra. Good landmarks are lacking on Cape Mordvinof; the peaks are not distinctive and usually are hidden by clouds.

(45) Good anchorage for large vessels is not found off the cape, but shelter from S winds can be had in two of the coves indenting the cape for boats no longer than 65 feet. The water deepens rapidly and evenly off the cape, and the 20-fathom curve is from 1 to 2 miles off the shoreline. No shoal of importance is known off the cape, and no danger to navigation has been found at distances greater than 1 mile offshore.

(46) By making good a course of **036°** from 3 miles **270°** of Cape Sarichef for 25 miles, vessels will be well outside the 20-fathom curve and the known dangers to navigation.

(47) E of Cape Mordvinof, the coast falls away slightly for 6 miles, where it turns abruptly E for 5 miles, and then takes a N direction forming **Urilia Bay**. This bay is open N, but affords protection from all winds from S of E or W. The approaches are clear, and the water shoals gradually to 6 fathoms, black sand bottom, about 0.8 mile from shore.

(48) From Urilia Bay to Isanotski Strait the coast trends NE, is very low, and has several rocky patches extending

0.5 to 1 mile from shore. Shishaldin Volcano, near the middle of Unimak Island, is described in chapter 7.

(49) **Swanson Lagoon** is a shallow lagoon on the N side of Unimak Island 7 miles W from **Chunak Point**. It has a narrow entrance and during some years light-draft launches can enter, but at other times only pulling boats can. Inside it is mostly a mudflat at low water with crooked channels 1 to 3 feet deep flowing between tidal flats. The lakes draining into the lagoon are spawning places for salmon, and the lagoon is important only as a fishery. About 0.8 mile E of the entrance is a cone-shaped hill, 85 feet high.

(50) Isanotski Strait (False Pass), used only by small vessels, is described in chapter 6.

(51) For 20 miles NE of Isanotski Strait to 175-foot-high **Cape Glazenap**, the coast is low with some grassy 50- to 100-foot bluffs. Except off the entrance to Isanotski Strait, dangers are within 1 mile of the shore. Cape Glazenap is prominent, because it is higher than the other places in this area.

(52) The **Kudiakof Islands**, low, narrow, and grass covered, extend from Cape Glazenap to Moffet Point, 16 miles to the NE. The wreck of an old schooner on **Glen Island**, the SW island, and domes on **Grant Point**, E of Glen Island, are conspicuous landmarks. The lights at the Cold Bay airport are visible over this general area on clear nights.

(53) Behind Cape Glazenap and the Kudiakof Islands is **Izembek Lagoon**, which is crossed by many shallow sloughs. Most of the extensive lagoon area is bare or awash; the bottom is mud and sand. The sloughs are difficult to follow except at low stages of the tide and are not recommended for craft drawing more than 3 or 4 feet.

(54) The Cape Glazenap channel into Izembek Lagoon is narrow and shifting. The entrance is close to the cape and is between breakers that extend seaward about 1 mile. The entrance channel has a depth of about 6 feet. During the summer, fishermen mark the approach with a drum buoy.

Charts 16520, 16011, 16363

(55) **Moffet Point**, 95 miles NE of Cape Sarichef, is a curving sandy hook with dunes 40 to 60 feet high. A channel leads into the NE part of Izembek Lagoon between Moffet Point and the NE end of the Kudiakof Islands. The depth over the bar is about 2 fathoms. The channel is between breakers, and during the summer is marked by drum buoys placed by local fishermen. Passage should not be attempted without local knowledge or by boats drawing more than 3 or 4 feet.

(56) **Moffet Lagoon**, behind Moffet Point, is a shallow area similar to Izembek Lagoon, but much smaller in extent. The two lagoons are joined S of Moffet Point. **Joshua Green River** empties into the E side of Moffet Lagoon.

(57) **Amak Island**, 10 miles NNW of Cape Glazenap, is of volcanic origin. Along the shores are bluffs and huge boulders except on the S side, where there is a small flat that was the site of a World War II airstrip.

(58) Foul ground extends about 1.1 miles off the N side of Amak Island. A reef that uncovers is off the SE side of the island and extends E about 0.3 mile. A good anchorage, affording protection from N to SW winds, is about 0.5 mile E of the island, 1 mile NE of the rocky ledge off the SE point, in 8½ fathoms, gravel bottom.

(59) The passage between Amak Island and the Kudiakof Islands is clear and is the usual track for small vessels. Depths in midpassage are 10 fathoms or more; currents are about 2 knots.

(60) **Sealion Rocks** are about 2.5 miles NW of Amak Island. The largest of the rocks, 95 feet high and prominent, is marked by **Sealion Rocks Light** (55°27'52"N., 163°12'11"W.), 94 feet (28.7 m) above the water and shown from a skeleton tower.

(61) Sealion Rocks is a Steller sea lion rookery site. There is a 3-mile vessel exclusionary buffer zone surrounding these rocks. (See **50 CFR 223.202**, chapter 2, for limits and regulations.)

(62) From Moffet Point the low coast trends almost 70 miles ENE to Cape Rozhnof, on the W side of Port Moller. A strong inshore set is frequently noted in this area.

(63) **Black Hill**, 24 miles NE of Moffet Point and 3 miles inland, is prominent. About 16 miles to the NE of Black Hill and 2 miles inshore is a low prominent sandhill known locally as **Last Knoll**, as it is the last knoll on the coast to be seen by a vessel bound E. Local vessels use this hill extensively in checking their distance to Port Moller.

(64) **Lagoon Point**, about 37 miles NE of Black Hill, is on the W side of the entrance to **Nelson Lagoon. Nelson Lagoon Light** (56°00'39"N., 161°05'36"W.), 15 feet (4.6 m) above the water, is shown from a skeleton tower with a red and white diamond-shaped daymark just E of Lagoon Point; this light marks the entrance to the lagoon. In May 1986, extensive shoaling was reported to exist in the approaches and in Nelson Lagoon; caution is advised. A large L-shaped dock and a launching ramp are on the N side of Nelson Lagoon about 2 miles W of the E end of Lagoon Point.

Chart 16363

(65) **Herendeen Bay** and **Port Moller**, 175 miles NE of Cape Sarichef, are mostly shallow, but deep channels lead almost to their heads. The common approach to both bays is over a very flat gently sloping bottom with low shores. Farther in are extensive sand and gravel flats between deep channels. The earth bluffs along the beaches have hills behind them that increase in height to the S. Herendeen Bay has deep water near its head, and the mountains are broken by several large valleys; the head of Port Moller is surrounded by high steep mountains, but deep water is restricted to narrow channels that apparently are kept open by tidal currents.

Pilotage, Port Moller

(66) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska.

(67) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General**, (indexed), chapter 3, for the pilot pickup stations and other details.)

(68) Vessels using Southwest Alaska Pilots Association pilots and en route to Port Moller can contact the pilot boat by calling "PORT MOLLER PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

(69) In the event prior pilotage arrangements have not been made, a stranger in the area should radio the cannery and request assistance.

(70) The entrance channel to Port Moller is marked by seasonal buoys.

(71) **Kudobin Islands**, on the W side of the entrance to Port Moller between Lagoon Point and **Cape Rozhnof**, are low and difficult to identify. **Walrus Island**, the easternmost island of the group, is marked by a light and at its E end by a distinctive 20-foot knob.

(72) **Entrance Point,** on the E side of the entrance to Port Moller, is marked by **Port Moller Light 5** (55°58'41"N., 160°34'59"W.), 18 feet above the water and shown from a tower with a square green daymark on the point. A cannery is inside the point at the village of **Port Moller**.

(73) **Harbor Point**, 4 miles S of Entrance Point and marked by a daybeacon, is a low, narrow, grassy, sand and shingle sandspit with high land behind it. Doe Point and Point Divide at the entrance to Herendeen Bay are bluffs that can be seen outside of Entrance Point.

(74) Extensive shoals just inside Port Moller are subject to frequent change.

Anchorage

(75) Anchorage can be had 3 miles W of Entrance Point in 8 fathoms, fair to good holding ground. Discoloration of the water in this area is caused by streaks of sediment carried by the tidal currents. Tide rips are caused by sand waves rising above the general depths.

Tides and Currents

(76) The current velocity at Port Moller is 1 to 2 knots. (See Tidal Current Tables for predictions.) The diurnal range of tide is 10.8 feet.

(77) The cannery pier inside Entrance Point is 350 feet long; depth alongside the face is about 6 feet. It is exposed to S and SE winds that blow across the peninsula and through the divides. Winds appear stronger at Entrance Point than at the anchorage in the middle of the bay entrance.

(78) It is advisable to be ready to move on short notice if moored at the wharf as SE winds come up very quickly, making it difficult to get away with the limited turning room. Many fishing vessels moor starboard side to the wharf in order to leave quickly. Larger supply vessels anchor in about 7 fathoms 1 mile S of the cannery.

(79) Fishing boats and barges find protection from the S and SE storms on the NW side of Harbor Point, 2.5 miles S of Entrance Point.

(80) Water is available at the pier at Entrance Point; gasoline, fuel oil, and diesel oil are stored for cannery use. A marine railway is maintained for cannery small boats. Limited provisions can be obtained at a store. A paramedic is at Port Moller in the summer and can be reached on 4125 kHz or VHF-FM channel 16. Air transportation is reported to be available. Radiotelephone and radiotelegraph communications are maintained.

(81) **Point Divide**, 9.5 miles SW of Entrance Point, has a 40-foot bluff with the land sloping gradually upward toward the mountain ranges. **Doe Point**, the SE end of **Deer Island** opposite Point Divide, is 50 feet high. The bluff on the E side of Deer Island is 150 feet high while the rest of the island and the mainland to the S and W are generally lower.

(82) **Hague Channel**, marked by buoys and leading to Herendeen Bay, is 1 mile wide at the N entrance, but contracts to 700 yards between Point Divide and Doe Point. Tidal currents are very strong in the channel; as much as 4 knots on the spring flood. The current does not follow the axis of the channel, but sweeps across the flats and narrow channel. As a result the channel is subject to change. In September 1983, a 3-fathom shoal was reported in Hague Channel about 2.5 miles W of Port Moller Light 5 in about 59°54'56"N., 147°28'06"W.

(83) A survey vessel anchored 3 miles NE of Point Divide in 10 fathoms, sand and gravel bottom, and 2.8 miles WSW of Point Divide in 8 fathoms, mud bottom; holding ground was good in both places.

(84) On the flood tide, the current causes spectacular tide rips between Point Divide and Doe Point, with an extensive area of swirls farther inside Herendeen Bay. Small craft should use caution during flood tide, especially when the wind is against the current.

(85) **Johnston Channel**, on the E side of Herendeen Bay, is 6 to 15 fathoms deep and very narrow with steep sides. **Halftide Rock**, on the E side of the channel 3 miles S of Point Divide, is awash at half tide. The current velocity is about 1.5 knots near the rock. **Eagle Rock,** near the E shore 3.8 miles S of Point Divide, is pyramid shaped and prominent.

(86) Small craft can find protection on either side of **Shingle Point,** in the small cove between Shingle Point and **Bluff Point**, and in **Mine Harbor**. Larger vessels can anchor off **Marble Point**. **Crow Reef**, off the entrance to Mine Harbor, bares at low water. The reef is an outlying danger in the upper bay. **Midway Reef**, extending 0.4 mile from the E shore of Mine Harbor, shows at half tide. A reef extends 0.5 mile W from **Crow Point**.

(87) A trail leads from the head of Herendeen Bay to Balboa Bay on the Pacific side of the Alaska Peninsula.

Chart 16011

(88) The coast is low between Port Moller and **Cape Kutuzof**, 20 miles to the NNE. The cape rises in a rounded bluff to 150 feet.

(89) **Cape Seniavin Light** (56°23'57"N., 160°08'47"W.), 175 feet (53.3 m) above the water, is shown from a small house with a red and white diamond-shaped daymark on rocky **Cape Seniavin**. Except for a cluster of small hillocks about 12 miles from the cape, low beach extends from Cape Seniavin to Seal Islands.

(90) Cape Seniavin is an important resting area (haulout) for Pacific walrus and nesting area for seabirds. Operating a watercraft in a manner which results in disturbing, harassing, herding, hazing or driving of walrus is prohibited under provisions of the Marine Mammal Protection Act. To ensure that walrus are not disturbed, marine vessel operators are requested to avoid transiting or anchoring within 0.5 mile of the Cape Seniavin walrus haulout.

(91) **Seal Islands**, 30 miles NE of Cape Seniavin, are several barrier islets, barely above high water, strung along the coast for about 10 miles. It is reported that small boats can find protection behind the islands. The coast continues low from Seal Islands to Port Heiden.

Chart 16343

(92) **Port Heiden**, 250 miles NE of Cape Sarichef, is 9 miles in greatest width and extends inland about the same distance. The seaward side of the bay is formed by barrier sandbars 5 to 10 feet above high water. **Strogonof Point** (56°53.3'N., 158°50.7'W.), is the NE end of the barrier beach that extends from the SW. Farther to the NE is crescent-shaped **Chistiakof Island**, which extends nearly to the mainland on the NE side of the bay.

Pilotage, Port Heiden

(93) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska.

(94) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General** (indexed), chapter 3, for the pilot pickup stations and other details.)

(95) Vessels using Southwest Alaska Pilots Association pilots and en route to Port Heiden can contact the pilot boat by calling "PORT HEIDEN PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

(96) The approach to Port Heiden should be recognized by the high, bold headlands and the airfield installations on the N side, but the bight back of Seal Islands, 20 miles to the SW, has been mistaken for the bay. **Aniakchak Crater** (see chart 16011) is about 15 miles E of Port Heiden, and **Black Peak** is about the same distance to the S.

(97) On the mainland back of Chistiakof Island is the village of **Meshik**. A commercial airfield, numerous radio towers, and several prominent buildings are about 4 miles NNE of the village.

(98) The seaward approach has a uniformly gently sloping bottom, with shoals extending considerably offshore. The 10-fathom curve is 6 to 8 miles off the bay, and the 20-fathom curve about 15 to 20 miles off. Over this area there is good holding bottom of fine sand and gravel, with some offshore sand waves lying perpendicular to the beach. Inshore of the 5-fathom curve the bottom tends to shoal abruptly.

(99) No passage is recommended between Strogonof Point and Chistiakof Island because of numerous shifting bars. Small boats, however, can approach Meshik around the NE end of Chistiakof Island, with local knowledge and by exercising caution. In September 1982, Chistiakof Island and the islands to the SW were reported to be submerged, forming more bars which close much of Port Heiden during inclement weather.

(100) The bottom in Port Heiden is sand and mud, and the holding properties are considered poor. The

landing area off the cannery at Meshik is long and sloping, and heavy loading should be done in the latter stages of a rising tide because of the flats that uncover at low water.

Tides and currents

(101) The diurnal range of tide in Port Heiden is 12.3 feet. The current velocity is 1 knot; the ebb current seems to be increased by a SE wind. Sea ice conditions are variable, with navigation seldom entirely suspended; drift ice usually restricts navigation to full-powered vessels from January through April.

Chart 16011

(102) From Port Heiden the same low coast extends in nearly a direct line to **Cape Menshikof** (57°30.0'N., 157°55.0'W.), where the high land of Port Heiden gradually recedes from the coast. Cape Menshikof is a high bluff, extending some distance alongshore, with hilly country back of it.

(103) **Cinder River**, about 10 miles SW from Cape Menshikof, is a shallow indentation in the coastline that is often mistaken for the Ugashik River.

(104) **Ugashik River** empties into **Ugashik Bay**, the wide indentation between Cape Menshikof and Cape Greig. The capes can be approached from W to within about 2 miles. The coast between the capes, including the river valley, appears low. **Smoky Point**, a bluff on the N side of the entrance, is 7 miles S of Cape Greig. Here the river is about 4 miles wide at high water. The indentations between the capes, including the mouth of the river, are filled with shoals. A channel in the river has a depth of about 10 feet, but a stranger could not follow it with safety. Only launches can approach the cannery at low water because of boulders in the channel. The river is fresh at low water about 5 miles above Ugashik. Each year the cannery company anchors two floats on the N side of the channel at the entrance.

(105) A cannery is near the entrance at **Pilot Point**. The wharf is 144 feet long, but dries at low water. Water is available on the wharf. Gasoline, fuel, and diesel oils are stored for cannery use. A machine shop and scowway are maintained by the cannery; a 4-ton crane is on the wharf. Radiotelegraph communication is maintained.

(106) A cannery at the village of **Ugashik**, 13 miles from the entrance, has a wharf 200 feet long with a depth of 14 feet at high water, but is reported dry at half tide. Water is available on the wharf and by barge at the anchorage. Gasoline and diesel oil are stored for cannery use. The wharf has a 2-ton crane. The cannery has a machine shop and a scowway. Small tenders are beached for light hull repairs.

Pilotage, Ugashik Bay

(107) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska.

(108) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General**, (indexed), chapter 3, for the pilot pickup stations and other details.)

(109) Vessels using Southwest Alaska Pilots Association pilots and en route to Vgashik Bay can contact the pilot boat by calling "UGASHIK BAY PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

(110) **Cape Greig**, 7 miles N of Smoky Point, is a prominent brownish bluff, with a few yellow vertical stripes extending several miles alongshore. It appears to be the seaward end of a low ridge with low land on each side. This and a peculiar notched mountain some distance inland are good marks. **Cape Greig Light** (57°44'30"N., 157°41'47"W.), 350 feet (105 m) above the water, is shown from a skeleton tower with a red and white diamond-shaped daymark.

(111) Cape Greig is probably the best landfall for the approach to Kvichak and Nushagak Bays from SW. N of Cape Greig, the coast is low and has no distinguishing features, and even radar is not of much assistance until abeam of Egegik Bay. Particular care should be taken to clear the shoals off the entrance to this bay. After passing the bay, Middle Bluff can usually be identified, although the lights on this bluff and on Red Bluff are small structures not easily seen from offshore. **Johnston Hill**, 357 feet high, is not readily identified by a stranger approaching from the SW, but abeam of the hill and thence to the NE a sharp tip on the N side is very prominent.

Chart 16323

(112) **Kvichak Bay**, the large arm at the head of Bristol Bay, extends NE from a line between the S entrance point of Egegik River and Etolin Point. The bay is an important fishing area for red salmon and has several canneries in its N part. Kvichak Bay is navigable for deep-draft vessels as far as the anchorage about 270° from the entrance to the Naknek River. The approach from the SW is restricted to a channel about 4 miles wide by **Big Flat**, an extensive tide flat extending off the E shore, and by **Dead Man Sands**, the large shoal in the middle of the bay NW of Johnston Hill. This shoal

uncovers about 8 feet, and the area N of it is very foul. Fishing boats and collecting barges use the area at half tide or higher. Caution is necessary as a number of fishermen have been lost when trapped by the tides.

(113) About midway between Middle Bluff Light and Johnston Hill are two low spits which, while not discernible visually from a vessel in midchannel, are quite prominent on a radarscope and hence are valuable landmarks during periods of low visibility.

(114) N of Naknek River are numerous shoals and uncovered banks. The best water is on the E side of the bay between Naknek River and Koggiung, but local knowledge is needed to avoid the shoals. The land is low and flat, but the tanks and buildings of the canneries and the lights, which are maintained during the canning season, are good landmarks.

(115) Kvichak River, which empties into the head of Kvichak Bay, is the outlet for Lakes Iliamna and Clark, on the W side of the mountain system that borders Cook Inlet. At maximum ebb, the confluence of discharges from Naknek and Kvichak Rivers is apt to cause overfalls that are dangerous to small boats. Winds in excess of 20 knots, opposed to currents, make the bay quite rough for vessels of light draft.

(116) Good holding ground is available any place in Kvichak Bay where depths are suitable for anchorage. The bottom appears to consist of a layer of coarse gravel, sand, and stones, with mud beneath. The shoal depths permit a generous scope of chain, which is necessary because of the strong currents and frequent blows. Only one anchor is recommended because a vessel tends to swing to the direction of the current, despite wind direction, with consequent fouling if moored with two anchors. Experience has shown that a scope of 8 or 10 to 1 will withstand the effects of a 60-knot wind and a 3.5-knot current. With a strong wind opposed to current, a vessel will usually lie broadside to both, and while such a condition sometimes causes an anchor to walk, no such tendency has been experienced in this area.

Tides

(117) The diurnal range of the tide at the Naknek River entrance is 22.6 feet. (See Tide Tables for predictions.)

(118) Navigators are reminded that the great range of tide in this bay must be considered when selecting an anchorage.

Currents

(119) In Kvichak Bay and River the current is very strong, and consequently the channel shifts more or less each year. The current velocity is 3.5 knots in the lower part of the bay and 2.5 knots in the main ship anchorage off Naknek. In Naknek River at the **hole** off Morakas Point, 4 miles above the entrance, the current velocities are about 1 knot on the flood and 2 knots on the ebb. (See the Tidal Current Tables for predictions.)

(120) It is recommended that vessels anchor against the current, when it is at maximum strength, so that engines may be used to offset the sudden strain when the anchor is let go. Caution must also be exercised, on flood current, to keep the vessel from being carried beyond the anchorage area while maneuvering. Since the currents usually follow the axes of the bay channels, navigators should make ample allowance when proceeding between Kvichak and Nushagak Bays; otherwise they are apt to be set to the N or to the S when they are on an E or W course.

Weather, Kvichak and Nushagak Bays Vicinity

(121) The best weather in Kvichak and Nushagak Bays appears to be from the latter part of May through July. The bays are frozen over during the winter, and the ice usually does not break up until May. Vessels approaching the bays during this time of the year, which they frequently do in preparation for the fishing season, are cautioned to do so during daylight because of possible ice.

(122) Storms have a tendency to move into this area from the Aleutian Islands during August and September, and, while their intensity usually is diminished, their rate of movement is decreased and at times they remain stationary while the depressions fill, thus causing extended periods of poor weather. Fog is not as prevalent in these bays as farther to the SW in Bristol Bay proper. Storms S of the Alaska Peninsula at times cause strong winds to draw through the valleys, such as that of the Egegik River, thus giving the effect of williwaws near the valley entrances.

(123) Mirages are seen frequently in the Kvichak Bay area during periods of calm, and particularly at low tide. They distort the appearance of bluffs and shorelines and make tanks and other elevated structures visible at greater distances than their altitudes warrant.

(124) **Egegik River** empties into Kvichak Bay 30 miles N of Cape Greig; **Cape Chichagof** is the N entrance point. It is a large river, 1 mile wide at the canneries, and is the outlet of **Becharof Lake**. (See also chart 16011.) It flows in a W direction for more than 28 miles.

(125) The lower part of the river forms **Egegik Bay**. A large part of its area is bare at low water. At the entrance, shoal water extends 6 miles offshore and should be given a wide berth by passing vessels. Entering vessels, depending upon their draft and condition of the sea, generally cross the entrance bar between half and full tide stages only. Moderately heavy seas will break

over this bar with any stage of tide, although it has 4 fathoms over it at high water. It is considered the most dangerous bar in the Bristol Bay area.

(126) In 1982, extensive shoaling was reported in the entrance to Egegik Bay; local knowledge is advised. In June 1994, a wreck was reported about 6.7 miles WNW of Coffee Point in about 58°15'19"N., 157°37'48"W.

Pilotage, Egegik Bay

(127) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska.

(128) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General**, (indexed), chapter 3, for pickup stations and other details.)

(129) Vessels using Southwest Alaska Pilots Association pilots and en route to Egegik can contact the pilot boat by calling "EGEGIK PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

Anchorage

(130) At the entrance to Egegik River are two partially protected anchorages with limited swinging room that are used by power scows and tugs. The principal one is the channel inside **Coffee Point**, with depths up to 5 feet. A smaller anchorage is just E of the wharf at Egegik, with depths from 6 to 11 feet. Ebb current at the smaller anchorage is very strong.

(131) Egegik River is navigable to small boats for its entire length into and across Becharof Lake. Although tidal to the foot of the rapids, mean range in its lagoons is only 1 foot; 5- to 6-foot drafts can be carried through the river, but the small lagoon reduces this to 3 or 4 feet, depending upon water stage. The controlling depth of the ¼ - mile rapids of the lake outlet is 4 feet at low water stage. Although its midchannel current averages 5 knots, slow-speed powerboats run it frequently with and without handline aid from the shore. The river is open from May to October. In 1970, the river was obstructed by numerous boulders possibly carried in through ice action.

(132) Freight from oceangoing vessels is generally lightered into Egegik from the ship anchorage off Naknek. **Egegik** has limited facilities; a cannery wharf that is 80 feet long dries at low water. Water and a 5-ton crane are available. Gasoline and diesel fuel are available for local use only. A pier, 70 feet long and 40 feet wide, with dolphins 10 feet off each outer corner, is 0.2 mile ENE of the cannery, just N of the twin tanks. Depths of 6 to 11 feet are off the pier. A cannery wharf, across the river, is 150 feet long with little water at its face. This cannery is inoperative, but its marine railway is active and hauls out barges, piledrivers, and tugs for winter layup. A removable fish conveyor and three pile dolphins extend offshore from Coffee Point. The conveyor and dolphins are removed after the fishing season. Two stores remain open all year in Egegik. Their supplies are principally food staples and clothing.

(133) Radiotelegraph communications are maintained. Transportation is available by floatplane from May to October, and is usually obtained from Naknek village or King Salmon Airport.

(134) **Naknek River** enters Kvichak Bay on the E side, about 10 miles S of Koggiung. **Cape Suworof** is the point on the N side of the entrance. The large 60-mile-long river has its source in **Lake Naknek**, where there are two villages.

Anchorage

(135) Anchorage can be had off the entrance to Naknek River in 35 to 40 feet; this is the head of navigation for deep-draft vessels. The approach channel to this anchorage has depths of 33 to 60 feet.

Tide

(136) The extreme range of **tide** at the river mouth is more than 25 feet. (See Tide Tables for predictions.)

(137) Shoals and banks, many of which uncover, fill the lower course of the river and extend 3 or 4 miles, then trend around N and join the body of the banks that fill the upper end of Kvichak Bay. In April 1980, a wreck, which covers with 13- to 15-foot tides, was reported in about 58°43'27"N., 157°01'02"W., and 300 yards off the N shore.

Pilotage, Naknek

(138) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska.

(139) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General**, (indexed), chapter 3, for the pilot pickup stations and other details.)

(140) Vessels using Southwest Alaska Pilots Association pilots and en route to Naknek can contact the pilot boat by calling "NAKNEK PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

(141) The Naknek River has several large salmon canneries; all have wharves that bare alongside at low water. Some of the canneries have not operated for years. Deep-draft vessels anchor about 6 miles off the entrance to the river and lighter their freight ashore in barges which are available at Naknek; the approaches

to the anchorages vary little from year to year. Vessels drawing up to 10 feet can go alongside the cannery wharves at half tide, but can remain afloat at low water only by shifting to what is called the **hole** just E of **Morakas Point**, which is 4 miles above the river mouth. The hole has depths of 9 to 14 feet at low water over a narrow crooked area 200 to 300 feet wide and about 0.5 mile long. Mooring buoys are maintained in this hole by the canneries on seasonal basis for use of power scows, tugs, and barges. Craft of these types, drawing up to about 12 feet, can proceed up the river with local knowledge some 12 miles from the mouth. In order to do this, vessels leave Naknek village 1 hour before high water. Beyond this point, small boats of 3-foot draft can proceed as far as the rapids, a distance of about 7.5 miles.

(142) An overhead power cable with a clearance of 48 feet crosses Naknek River about 1.3 miles above Morakas Point.

(143) All active canneries maintain radio communication. Limited repair facilities, including machine work, are available at the canneries, as well as water in any quantity. During the fishing season, water is available at the main ship anchorage by water barge. Diesel oil, gasoline, and lubricating oil are available in quantities sufficient for normal demands, and limited amounts of coal and stove oil also are available. Delivery can be made alongside the fuel dock for vessels drawing up to 10 feet at better than half tide or by drums to ships at anchorage. There is no fuel oil. Provisions in limited quantities are available.

(144) **Naknek** is on the N side of the Naknek River about 1.5 miles from the mouth. A nurse is on duty during the winter, and, during the cannery season, each cannery employs a doctor whose services are available to the public for a fee. Weekly mail service is by plane throughout the year. Regular scheduled steamers also carry mail during the summer. A road leads 0.8 mile inland to a lake used as a landing place for floatplanes; another road goes about 12 miles SE to **King Salmon Airport**. Transportation over land in this area is entirely by plane. Several floatplanes at the inland lake are available for hire or charter. The airport has scheduled freight and passenger service to Anchorage. There is a telephone line from Naknek to the airport. **South Naknek** is on the S side of the Naknek River, directly across from Naknek.

Weather, King Salmon Vicinity

(145) Nearness to the ocean tends to provide King Salmon with a climate that is predominantly maritime in character, with diurnal and seasonal temperature ranges normally confined to rather narrow limits. However, the area occasionally experiences definite continental influences that cause temperature extremes which tend to exaggerate the climatic conditions generally prevailing. The extreme maximum temperature for King Salmon is 88°F (31.1°C) noted in June 1953, but days in summer with maximum readings reaching the 80°F (26.7°C) mark are extremely rare. In fact, July, the warmest month, averages only 5 days with temperatures reaching 70°F (21.1°C) or above. The coldest temperature on record is -48°F (-44.4° C) in January 1989.

(146) From December through March the area experiences rather strong winds, due to the passage of east moving Aleutian lows. The strongest winds are usually from a northerly direction, developing after the low centers have passed on E of the local area. Winds of 55 knots or more have occurred in all months with an extreme of 97 knots in November 1965.

(147) Cloud coverage in the King Salmon area is generally quite high, averaging about eight-tenths the year around. Mountain ranges to the S, E, and W tend to provide uplift for air moving toward King Salmon from these directions and produce considerable cloudiness which is carried out across the local area. When the wind movement is inland from the SW, the air arrives carrying a high moisture content to condense in low level cloudiness, and this action contributes to the frequent fog occurrences all months of the year. Fog development is most frequent during July and August. During the winter the high moisture content of the air causes substantial accumulations of frost on outside objects.

(148) Seasonal snowfall averages about 46 inches (1168 mm) and has ranged from 94 inches (2388 mm) to 16 inches (406 mm) for annual extremes. The maximum depth on the ground during the winter season averages about 10 inches (254 mm). This indicates the extent of melting that takes place with the snow accumulation. Although most of the snow is received during periods of general snowfall over most of the SW mainland, a considerable amount of snow is brought in as snow showers that move inland from the Bristol Bay area. These showers are generally quite local and usually of short duration, but they often follow in rapid succession to bring sizable accumulations of snow within relatively short periods of time. December, with an average of about 9 inches (229 mm) of snowfall, has the greatest monthly average snowfall amount. Only July and August have never seen snowfall.

(149) Ice in the bay near King Salmon usually becomes safe for man around November 11, with the Naknek River becoming safe for man around November 25. Breakup on the bay averages about April 6; the breakup on the river averages about April 18.

(150) (See page 518 for **King Salmon Climatological Table.**)

(151) **Libbyville**, on the E side of Kvichak Bay, 3.5 miles N of Naknek River entrance, has a cannery with a 100-foot-long wharf.

(152) Common practice in this area is to avoid all movement of vessels N of Naknek River at the lower stages of the tide or on a falling tide. At or near high water it is safe to navigate almost any part of the area with vessels drawing up to 7 or 8 feet; vessels going aground on a rising tide are floated in a very short time and may proceed. No known rocks exist on the shoals, and temporary groundings do not often damage vessels.

(153) Most of the area between Naknek and Kvichak Rivers bares at some stage of the tide.

(154) The E channel from Libbyville to Koggiuing has depths that vary from 3 to 23 feet at low water. Local knowledge is necessary to avoid grounding on a falling tide.

(155) **Koggiung**, a village on the E side of Kvichak River, has several canneries. All of the wharves are dry at low water and have mud bottom alongside. All have water connections. Fuel oil, diesel oil, and gasoline are stored for cannery use.

(156) The longest wharf at Koggiung is 450 feet. The marine railway at this wharf can haul out vessels up to 60 tons at high water.

(157) **Kvichak River** (see chart 16013), from Koggiung to Iliamna Lake, is 50 miles long. In the upper half of its course it is much broken by islands and bars into narrow, shallow channels. The lower half is tidal.

(158) Occasionally vessels drawing 14 feet have ascended the river as far as the mouth of Alagnak River, but anchorage is difficult to find. Kvichak River is navigable for cannery tenders of 10-foot draft to **Alagnak River**, 22 miles above the mouth of Kvichak River. Launches of 3- to 4-foot draft can go on up into Iliamna Lake.

(159) In 1984, the channels through the entrance to Kvichak River were reported to be extremely changeable. Local knowledge is advised.

Anchorages

(160) The Kvichak River has four recommended anchorages where mooring buoys are maintained during the fishing season. Water is available at the canneries.

(161) At **Graveyard Point**, near the mouth, fair protection is available in depths of 10 to 12 feet in all weather except strong SE storms. The bottom is fine gray sand with good holding ground.

(162) **Graveyard Point Light** (58°52'03"N., 157°00'49"W.), 55 feet (16.8 m) above the water, is shown from a skeleton tower with a red and white diamond-shaped daymark 0.7 mile S of Graveyard Point.

(163) Off **Nakeen** and the mouth of **Squaw Creek**, good protection in all weather is afforded in depths of 13 to 23 feet. The bottom is fine gray sand; the holding ground is good.

(164) **Duck Creek Light** (58°57'18"N., 157°01'55"W.), 48 feet (14.6 m) above the water, is shown from a skeleton tower with a red and white diamond-shaped daymark on S point of entrance to Duck Creek.

(165) At **Kvichak** good protection is afforded in depths of 8 to 10 feet in all weather except a strong N storm. The bottom is gray sand; the holding ground is good.

(166) At **Levelock** (see chart 16011) good protection is afforded in all weather, in 8 to 10 feet, fine gray sand bottom, with good holding ground.

(167) Common practice on the Kvichak River is to restrict navigation to the direction of the current and to a stage about half tide, if possible. Vessels grounding on a rising tide are floated in a short time, and temporary groundings cause no damage since there are no rocks on the shoals.

(168) Local knowledge of the channels is necessary, and anyone not thoroughly familiar with the river is strongly advised to obtain a pilot from one of the canneries.

Chart 16013

(169) **Iliamna Lake** is about 70 miles long and generally from 7 to 17 miles wide. It is about 50 feet above tidewater. Reported soundings indicate a depth at the E end of many hundred feet. The lake is usually frozen from late December until late in May; the snow leaves the low ground in April, remaining until June in the pass between Iliamna Lake and Cook Inlet. Some snow may be expected in September, but the ground is not permanently covered at low altitudes until some months later.

(170) **Old Iliamna** is an abandoned village 3.5 miles above the mouth of the **Iliamna River**, which drains into the E end of Iliamna Lake.

(171) A 15.5-mile State-maintained gravel road connects Pile Bay, at the E end of Iliamna Lake, and Williamsport on the W shore of Iliamna Bay. The road is open from June to October. (See chapter 4, for a description of facilities available at Williamsport.)

(172) **Newhalen River** (59°41.5'N., 154°56.0'W.), about 20 miles long, connects Iliamna Lake with Lake Clark. The upper 10 miles can be navigated by canoes and poling boats. Rapids and reported falls make even canoe navigation impossible for the lower 10 miles. These rapids may be avoided by a 5-mile portage.

(173) **Iliamna** is near the mouth of Newhalen River. An airfield is adjacent to the village.

(174) **Lake Clark** is about 45 miles long and from 1 to 3.5 miles wide. It is about 220 feet above tidewater, and is tributary to Iliamna Lake and Newhalen River.

Chart 16322

(175) **Nushagak Bay** and **Nushagak River**, on the N side of Bristol Bay near its head, are important for the extensive salmon fishing and a number of large canneries that operate during the summer. The bay is 17.5 miles wide at the entrance between Protection Point and Etolin Point. The surveys of 1948-50 show that the bars and channels in the upper bay and river have changed considerably. Local authorities state that the area between Clarks Point and Dillingham (Snag Point) is particularly subject to change on the ice runout each spring.

(176) Nushagak Bay and River are obstructed by extensive shoals near the shores, and by long bars, partly bare at low water, which generally extend in the direction of the channels. In the absence of aids, navigation is safe only in the daytime when the marks and distant peaks can be seen. The worst dangers in the approach are the extensive shoals S and SE of Cape Constantine, the outer one being nearly out of sight of land.

Pilotage, Nushagak

(177) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the inside waters of the State of Alaska.

(178) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General,** (indexed), chapter 3, for the pilot pickup stations and other details.)

(179) Vessels using Southwest Alaska Pilots Association pilots and en route to Nashagak Bay can contact the pilot boat by calling "NUSHAGAK BAY PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

(180) N of Dillingham is a sparse growth of timber, which becomes heavy farther inland, but to the S are only occasional clumps of alder bushes.

(181) The peninsula of **Cape Constantine** is low rolling tundra country, with bluffs in places. **Nichols Hills**, 125 feet high, are small sand knolls, the highest part of a ridge that follows the E side of the cape, and is 5 miles NW of Protection Point.

(182) At the SW end and on the SE side of the cape are the entrances of two lagoons that can be entered by boats at high water when there is no surf. At low tide, water remains in the entrance and for a short distance inside the first lagoon; the second lagoon is bare.

(183) Shoals with little water on them in places extend 6 miles S from Cape Constantine, and the outer shoal, Ustiugof Shoal, is 8 to 9 miles SE from the cape. These shoals are in the form of long ridges trending in the direction of the set of the tidal currents around the cape to and from Nushagak Bay. They are steep-to, especially on the offshore side, and soundings will not give sufficient warning to avoid them.

Currents

(184) The tidal currents NE of **Sterling Shoal**, off Cape Constantine, have a velocity of about 2 knots. (See the Tidal Current Tables for predictions.)

(185) **Ustiugof Shoal** is a narrow ridge with a least depth of 13 feet, and has a length of 15 miles in a 052° direction. Close to its SE side are depths of 11 fathoms or more. From a vessel near the shoal, Cape Constantine can be seen in clear weather. The greatest care is required when S or SE of the cape. The shoaler ridges are generally indicated by rip or breakers at low water, but there is generally nothing to indicate Ustiugof Shoal.

(186) **Protection Point**, the E end of Cape Constantine, is a low marshy spit which extends 1.5 miles from the higher land. On the N side of the point, 2 miles WNW of its end, is the entrance to a lagoon; small boats can anchor in, or close inside the entrance, but the current is strong on the ebb. The current velocity off the point is about 2 knots on the flood and 3 knots on the ebb. A narrow shoal which uncovers in places at low water extends 4.2 miles S from the point. The S half of the shoal is about a mile from shore; between the point and the N end of the shoal is a narrow channel. A detached shoal about 2 miles E from the point has a least depth of 15 feet.

(187) **Nichols Spit**, E of Nichols Hills, forms a cove, dry at low water, that can be entered by boats at high water and affords shelter except from N winds.

(188) **Igushik River**, 15 miles N of Protection Point, is a crooked winding river on the W side of the bay; vessels up to about 24-foot draft have been taken out. The channel into the river is not surveyed. The flat on the E side of the channel leading to the mouth of the river shows for nearly its full length at low water. The bar at the entrance of the channel has depths of 5 to 14 feet on it, and is about 7.5 miles SE of the mouth of the river and 8.8 miles N from Protection Point.

(189) **Igushik Ridge**, on the W side of Igushik River, is prominent, being about 260 feet high near its N end, where it breaks sharply to the river. The peninsula E of the river is low.

(190) **Togiak National Wildlife Refuge** includes Igushik and Snake Rivers and is a Marine Managed Area. (See **MMA 8-1**, Appendix C, for additional information.)

(191) **Snake River**, 10 miles N of the mouth of Igushik River, is used only by fishing boats. The channel leading to the mouth of Snake River has depths of about 7 to 29 feet, and is well defined at low water by the flats, which uncover, except at the entrance.

(192) The land on the E side of the bay is low and rolling tundra, and the entrance point is rounding without a distinct point.

(193) **Etolin Point**, the larger rounded point between Kvichak and Nushagak Bays, is flat, tundra covered, with several shallow lakes, some of which have been used for floatplane landings. The W extremity of the point is a 90-foot-high bluff. A 149-foot-high rounded hill, 2 miles E of the point, is a prominent landmark when approaching from seaward.

(194) Shoals covered less than 12 feet extend 5 miles S of the rounding point SE of Etolin Point, while depths of 30 feet or less are more than 10 miles from the shore. The shoaling is gradual, and sounding is a good guide in approaching the E shore when just outside a line joining Etolin and Protection Points. Above this line in the E half of the bay are long shoals, most of which show in places at low water. A **341°** lighted range marks the channel to Ekuk. **Ekuk Bluff**, NNW of Etolin Point, is 170 feet high and prominent. **Ekuk** is a native village on a spit at the N end of the bluff. The lagoon inside the spit is bare at low water. The cannery wharf at Ekuk is 150 feet long with 7 feet alongside at high water. Gasoline, diesel oil, and fuel oil are stored for cannery use, and water is available.

(195) **Clarks Point**, 1.5 miles N of Ekuk, is low and has an extensive gravel beach. On the point are a large Alaska Packers Association cannery and the village of **Clarks Point**. The ridge, 169 feet high, terminates in a bluff at the shoreline 0.6 mile S of the point and is prominent from seaward. Several large water tanks near the shore end of the bluff are prominent landmarks. A wreck, awash at low water, is about 1 mile SW of the cannery.

(196) The Alaska Packers Association wharf at Clarks Point is 175 feet long and has a depth alongside of about 8 feet at high water. A T-pier with a face of 80 feet and a depth alongside of about 13 feet at high water is extended out 90 feet from the face of the main wharf during the cannery season. The main wharf has a 20-ton crane on the NE corner and a 3-ton crane on the SW corner. Radiotelephone communication is maintained.

(197) Water is piped to the wharf. A general store is operated throughout the year. Gasoline, diesel oil, and fuel oil are stored for cannery use. The marine railway can haul out vessels up to 150 tons at high tide; a small machine shop is nearby.

(198) **Clark Slough**, 1.5 miles NE of Clarks Point, is navigable for launches at high water for about 17 miles. The bar that must be crossed at the edge of **Combine Flats** when entering the slough bares at low water. Fishing craft and tenders use Clark Slough and the part of Combine Flats behind Clarks Point for shelter during heavy SW weather.

(199) **Nushagak Point**, on the E side of Nushagak Bay and 7 miles N from Clarks Point, is the outer end of a prominent 250-foot ridge, to the E of which is a deep valley. **Nushagak**, a small village on the point has two abandoned canneries which serve as a fish camp during summer. There are no wharves. Vessels may approach as closely as their draft permits and use small boats or barges for reaching the shore. Landing at low water is difficult because of the very sticky mud on the flats, but a good landing can be made on the gravel beach at high water. Nushagak has no post office or supplies. Mail is received through Dillingham.

(200) From **Coffee Point** to **Snag Point**, 9 miles to the NE, the W shore of Nushagak Bay consists mostly of bluffs. **Bradford Point**,. between Coffee Point and Snag Point, is opposite **Grassy Island**, which is awash at highest tides.

(201) **Kanakanak**, at Bradford Point, is a small settlement which includes the former sites of Dillingham and Kanakanak, and is connected by roads with the present site of Dillingham at Snag Point. A hospital is in Kanakanak, about 7 miles from Dillingham.

(202) **Dillingham** is the principal settlement and source of supply in Nushagak Bay. The village has a school and churches, and hospital facilities at Kanakanak may be reached by road. Ordinary supplies are available at several general stores. Petroleum products, except fuel oil, can be obtained from the Delta Western, Dillingham Terminal Wharf. Fuel oil for the canneries in Nushagak Bay is generally brought in by tanker early in the season and transferred to cannery barges at the anchorage off Clarks Point. Limited quantities of fuel oil can be obtained from the tanks of supply vessels handling general cargo for the bay.

(203) Vessels drawing 23 feet ascend the bay on high tide and anchor just below Snag Point. Supplies are lightered to Dillingham either by the canneries' equipment or by private equipment. The oil and cannery wharves can be approached only at high tide; vessels drawing 12 feet moor at these wharves on higher high tides. A 208-foot City Dock accommodates large ships and barges for unloading with a depth of 3 feet alongside.

(204) The cannery at Dillingham has a wharf 300 feet long with a depth alongside of 2 feet at low water and can be used by small tenders at high tide. Gasoline,

diesel oil, and fuel oils are stored for cannery use. Telephone service is available. The cannery maintains radiotelephone and radiotelegraph communications. A marine railway at the cannery can haul out vessels up to 100 tons at high tide.

(205) **Dillingham Small-Boat Harbor** on the W side of Dillingham provides about 950 feet of float space for small fishing and pleasure craft. A dredged channel leads from Nushagak Bay to the basin, but should only be used with local knowledge. The basin retains less than 5 feet of water. The entrance channel and basin are subject to rapid shoaling due to sediments from Nushagak Bay, and annual maintenance dredging is attempted each year. The **harbormaster's office** is across from the small boat harbor.

(206) An airport 1.5 miles W of the village, provides air services the year round. An aerolight is at the airport.

(207) **Wood River** has its entrance N of Snag Point, and has a length of about 24 miles to **Lake Aleknagik**. Its width varies from about 600 yards in its lower part to about 50 yards where it joins the lake. A depth of 3 to 3½ feet at low water can be carried 15 miles upriver and not more than 2½ feet to the lake; at high water 4 feet can be carried this distance. The lake is about 24 miles long and navigable for its entire length.

Prominent features

(208) N of Nushagak Bay is a chain of prominent mountains that are snow-covered in early summer, but are bare except in the ravines by the middle of July. In clear weather the peaks show from a long distance seaward, but much of the time they are obscured by clouds and haze. Many of the summits are shown on the chart.

Channels

(209) The controlling depth in Nushagak Bay and River is about 10 feet to Dillingham, 30 miles above the mouth. Small vessels of 2½-foot draft can continue up Nushagak River to **Nunachuak**, 100 miles above the mouth.

Anchorages

(210) Vessels can anchor in the outer part of Nushagak Bay in N weather. The wind from this direction does not

appear to blow with force during the summer. This part of the bay is exposed to a heavy sea during E to S weather. The strong current causes a vessel at anchor to lie stern or broadside to the sea when the wind opposes the current. The bars seem to afford little protection. In SW and NE weather, the W and E sides of the bay, respectively, should be selected.

(211) Good anchorage can be found S of Ekuk Bluff, in 30 to 35 feet, mud bottom, where the current is not strong. During the cannery season, mooring buoys, placed in a line parallel to the beach, are maintained for tally barges in the area S of Ekuk Bluff and E of the main channel.

(212) In SW weather, good anchorage in about 18 feet is offered to vessels drawing 12 feet or less, 1 mile **021°** from Protection Point. Deeper draft vessels should anchor farther NE.

(213) Above Ekuk good anchorage will be found wherever the depth will permit. This part of the bay is very choppy in heavy weather, but the sea seldom, if ever, is heavy enough to endanger a vessel. The bottom is sand, but the anchor holds well if given a scope of about 60 fathoms. The currents are strong, and care should be taken to avoid dragging. Vessels remaining long are anchored in line in the channel to interfere as little as possible with the nets. During the cannery season, mooring buoys are placed by the canneries in lines parallel to the channel off Ekuk Bluff and Clarks Point.

Tides

(214) The tides in Nushagak Bay are influenced to some extent by strong winds. The diurnal range of tide at Clarks Point is 19.5 feet. (See Tide Tables for predictions.)

Currents

(215) The currents in Nushagak Bay have considerable strength; velocities of about 4 knots have been observed on both the flood and the ebb. The ebb usually begins shortly before high water and continues to run after low water, roughly about 7 hours ebb and 5 hours flood. The period of slack water is usually short. The currents generally set fair with the channels, but in navigating the bay the course is often across the current and allowance must be made for it. The velocity is influenced by freshets and continued winds, which also affect the times of slack water. A current of over 5 knots may be experienced at times. (See Tidal Current Tables for predictions in Nushagak Bay.)

Weather, Nushagak Bay Vicinity

(216) The weather is variable, but it is considered better than farther W. Spells of bad weather occur, and their duration increases in the late summer. SW winds sometimes predominate in the early summer and E winds later. E winds bring thick weather and rain, and are accompanied by a low or falling barometer. SW winds, if moderate, bring fair weather, but if strong bring rain. NE winds bring fine clear weather, but seldom blow steadily. In settled weather the wind may be light from any direction, accompanied by showers. After a gale there is usually no shifting of the wind or sudden breaking of the storm, but the wind decreases, and there is a gradual return to fair weather. Fog sometimes sets in from the sea, but there is little fog during the summer

Ice

(217) The movement of the ice is variable, depending upon the direction of the wind. It is said that the arrival of cannery vessels has been as late as June 17. The ice is not solid, but drifts in floes with the wind and current. NE winds drive the ice out of the upper bay to ground and breakup on the shores and sandbars of the W side of the bay. Cannery floating equipment is hauled out upon completion of the season in mid-August, and the salmon pack is taken out at that time. One winter supply vessel generally makes the last trip into the bay about the middle of September.

Routes

(218) The channels and bars of Nushagak Bay and River are probably subject to constant change because of the action of currents and to a smaller extent by the action of the sea. Changes of considerable extent are reported by those of long experience. A margin of safety should therefore be allowed for the soundings found by the survey. It is also well to remember that with a very low tide the water may fall as much as 4½ feet below the plane of reference of the chart.

(219) The navigation of the bay is not easy, and a stranger should proceed with great caution. Tide rips may be taken as good evidence of shoals. The shoals are long ridges trending in the same directions as the tidal currents, and the danger of stranding is greatly increased if a course is set across the currents. A stranger should navigate only on a rising tide and is advised to communicate by radio with one of the canneries and arrange to have a pilot sent out.

(220) It is recommended that vessels bound to Nushagak make Cape Greig (see chart 16011), which is high and easily recognized and marked by a light, then shape the course for the entrance to the bay, favoring the Etolin Point side in preference to the Cape Constantine side. The currents that may be experienced when crossing from Cape Greig are not known, but there may be considerable set. Great care should therefore be exercised in approaching the entrance. The land at the entrance

when first seen in approaching is indefinite, and presents no feature that can be readily identified.

(221) Enter the bay on the **341°** lighted range through **Ship Channel**. Favor the E side of the range until clear of the 6-foot spot on the E edge of **Long Sands** and take care to avoid the 3- and 4-foot spots near the edges of the channel through the N end of the bar. When through the cut on the bar, leave the range and follow the general trend of the shore to off **Ekuk**.

(222) **Note.**–On the flood, just inside the bar, cross a distinct rip and keep it about 150 feet off the port side. The waters of the upper bay and river carry heavy sediment, and the only indications of shoals usually are swirls or rips. On the ebb the waters of the upper bay are practically fresh, but they become brackish on the flood.

(223) From Clarks Point to the upper canneries, numerous mud and sandbars are exposed at low water in the central and W parts of the river. Shoal water in the middle of the river is extensive and restricts crossing during low water; nearly all navigation of this section is done on a rising or high tide. Navigation of this area should not be attempted by large vessels except on a rising tide and then only with local knowledge or with a local pilot. Local authorities state that the area is subject to change on the ice runoff each spring.

(224) Present traffic follows the E shore above Clarks Point, keeping about 1 mile off. The channel follows close along the edge of the E mudflats and is marked by local buoyage during the summer. The W line of this buoyage marks the E edge of the channel, and the other two or three lines mark set-net sites. The channel is 0.8 mile offshore at the N end of Combine Flats and 0.5 mile off at Nushagak Point. One mile below Nushagak Point, vessels cross over and pass 0.2 mile off Bradford Point, then follow the W shore at this distance to the anchorage off Dillingham. Traffic generally starts upriver on half-flood tide.

Repairs

(225) The large tides and the flats make it easy to beach a vessel of drafts up to about 18 feet. A good place is at Clarks Point. Small machine repairs can generally be done at the companies' shops.

Communications

(226) The Northland Marine Lines makes several trips a year into the Nushagak Bay area, the earliest about May 15 and the latest about September 15, depending upon ice conditions. Commercial airlines serve the area. Dog teams are used to some extent by natives and trappers during the winter, and small boats are used for local travel during the summer. Tankers and barges bring in diesel oil, gasoline, lubricating oil, and fuel oil. All canneries and their tenders are equipped with radiotelephone, and radio traffic can be handled through the cannery shore stations during the season. Radiotelephones are maintained by cannery caretakers during the winter.

Charts 16011, 16315, 16305

(227) The area between Cape Constantine and Cape Newenham (58°40'N., 162°10'W.) is unsurveyed, and there are indications that the present charts are considerably in error. Vessels setting a course from outside Ustiugof Shoal (58°17.0'N., 158°39.0'W.), to pass about 2 miles off Cape Peirce (58°38.0'N., 161°45.0'W.), in thick but otherwise moderate weather, have reported making Hagemeister Island dead ahead. This undoubtedly is because of a N set in this vicinity. In the thick weather which prevails in this locality safety is assured only by constant sounding.

(228) **Kulukak Bay**, entered between **Kulukak Point**, 38 miles NW of Cape Constantine, and Right Hand Point, about 9 miles WSW, is shoal; there is a depth of 3 fathoms just inside the entrance and the N half dries at low water. The buildings of an abandoned native village are above the bluff at the NW corner of the bay.

(229) **Togiak National Wildlife Refuge** includes Kulukak Bay and is a Marine Managed Area. (See **MMA 8-1**, Appendix C, for additional information.)

Pilotage, Kulukak Point

(230) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska.

(231) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General,** (indexed), chapter 3, for the pilot pickup stations and other details.)

(232) Vessels using Southwest Alaska Pilots Association pilots and en route to Kulukak Bay can contact the pilot boat by calling "KULUKAK BAY PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

(233) **Right Hand Point** is the S extremity of a mountainous peninsula that separates Kulukak Bay from Togiak Bay.

(234) **Walrus Islands**, consisting of three islands and three above-water rocks, are in the approach to Togiak Bay. Several shoals of 3 fathoms or less are between the islands as well as S of the group. Shoaling is rapid after reaching a depth of 3 fathoms, requiring continuous sounding while navigating these waters. Thick weather is frequent in this area, and often the higher islands are fog-capped when the weather is otherwise clear. The

diurnal range of tide is 9.5 feet. The land areas and adjacent waters of Round Island, Crooked Island, High Island, Summit Island, The Twins, and Black Rock are established as the **Walrus Islands State Game Sanctuary**.

(235) **Round Island**, the easternmost of the group, is 1,410 feet high and is about 10 miles SSW of Right Hand Point. Access within a three mile radius of Round Island is prohibited without a permit from the Alaska Department of Fish and Game. The W side of the island is precipitous and bare in the lower elevations. A narrow beach makes around the E side. To the N the island terminates in a distinct pinnacle rock. A reef, bare in places and consisting of sand and smooth boulders, extends about 1.3 miles NW of the pinnacle rock.

(236) Indifferent anchorage may be found about 1 mile NE of the island in about 11 fathoms, hard sand bottom.

(237) **Crooked Island**, 1,254 feet high, is 9 miles WNW of Round Island; it is almost entirely covered by tundra. There are large coves on both the SW and E sides of the island. These coves have been reported to be shoal; the 3-fathom curve extending about 2 miles offshore on the W side of the island. About 0.5 mile off the E side of the island just S of the large cove, anchorage with protection from W to SW winds and good holding ground can be found. A bank, covered 2 fathoms or less, is about 1.5 miles off the NW side of the island. Shoal extends the full length of the W side of the island.

(238) **High Island**, the westernmost of the Walrus group, is 1,716 feet high and is 2 miles W of Crooked Island; this island is steep-to on its E and W sides, with a few strips of sand beach.

(239) **The Twins** are two isolated rocks 3 miles S of Crooked Island. The larger is 300 feet high; the lower and SW of the two is 100 feet high.

(240) **Black Rock**, 131 feet high, is 3 miles E of the N part of Crooked Island. From the air the rock appears to be an upthrust on a submerged ridge, the axis of which parallels that of Crooked Island. Black Rock, the SE tangent of Crooked Island, and the Twins are very nearly on range.

(241) **Summit Island**, 801 feet and 505 feet high near the S and N ends, respectively, is 8.5 miles WNW of Right Hand Point, and 2 miles from the E shore of Togiak Bay. Good anchorage, in 5 to 6 fathoms and sheltered from SW weather, may be had in a bight about 0.5 mile off the middle of the NE side of the island in 5 to 6 fathoms, sand bottom.

(242) **Togiak Bay**, N of the Walrus Islands, and about midway between Cape Constantine and Cape Newenham, is shoal; the head of the bay uncovers to the S for 3 to 4 miles. A submerged ledge and rock extend 0.2 and 0.5 mile, respectively, from **Rocky Point** at the E entrance of the bay.

(243) **Togiak** is near the head of the bay. The waters off Togiak are shallow and not navigable during low water. Good anchorage can be had for deeper draft vessels on the E side of the bay about 1 mile off **Anchor Point** in 5 to 6 fathoms of water, sand bottom.

Pilotage, Togiak

(244) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska.

(245) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General,** (indexed), chapter 3, for the pilot pickup stations and other details.)

(246) Vessels using Southwest Alaska Pilots Association pilots and en route to Togiak can contact the pilot boat by calling "TOGIAK PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

(247) **Hagemeister Island**, 10 miles W of High Island, is mountainous except for about 5 miles at the N end. Shoals surround the island and extend E 20 to 25 miles, including the area between Hagemeister Island and the Walrus group.

(248) Shoals and sand waves with depths less than 2 fathoms extend E and SE from the northern half of Hagemeister Island in the direction of High Island. Ice has been observed grounded there. Foul ground is also reported as extending N of the N point of the island.

Current

(249) Current observations were made in June 1948 for a period of about 10 hours, about 8 miles SW of Hagemeister Island. The current sets approximately 335° and 165° with velocities at strength of about 0.8 knot and 1.5 knots, respectively. In June 1985, the NOAA Ship RAINIER anchored 3 miles off the SE corner of Hagemeister Island observed currents flooding 070° and ebbing 240° at velocities up to 4 knots.

(250) **Hagemeister Strait** is about 16 miles long between the island of that name and the mainland. It is 3 to 4 miles wide, but shingle spits contract it in two places to less than 2 miles. Good anchorage was found under **Tongue Point**, the shingle spit making out from the mainland about midway of the channel. Good anchorage can be found throughout the strait avoiding the shoal areas NE of Hagemeister Spit. In 1991 NOAA Ship RAINIER observed currents of 0.5 to 1.5 knots flooding **060°** and ebbing **220°** near Estus Point. Currents are significantly stronger near the western end of

Hagenmeister Spit causing tide rips in the area. Strong currents and an unstable bottom result in shifting sand waves throughout the strait and its approaches. Shoal areas that lie directly S of the spits on both sides of the strait cause waves to break at times of heavy swell.

(251) The **Osviak River** empties into the strait about 13 miles W of Tongue Point. In 1991, NOAA Ship RAINIER reported an average river depth of 1.3 feet and that many portions of the river bare at low stages of tide. The channel runs approximately mid-stream. The river is navigable in this channel for two miles upstream of the entrance by shallow draft vessels when the tide is 5.3 feet or greater. The abandoned native village of **Osviak** is on the W bank of the river about 3 miles from the mouth.

(252) **Cape Peirce** (58°38.0'N., 161°45.0'W.), of moderate height and symmetrical form, is 22 miles W of the S end of Hagemeister Island, and 15 miles SE of Cape Newenham. A shoal area, with depths of 2 to 3 fathoms over it and possibly less, is reported to extend some distance W from the cape. Depths of 19 fathoms, about 7 miles WSW of the cape, were found outside the charted 20-fathom curve. Depths of 10 fathoms are found 2 miles S of the cape, and good anchorage in 10 fathoms is found inside **Shaiak Island**, (see chart 16300), just E of the cape. There are reports of good anchorage, sheltered from N weather, in the bight NW of Cape Peirce. To make the anchorage from E, give Cape Peirce a berth of about 3 miles and steer **009°** for the junction of the NW end of the sand beach with the rocky shores; select anchorage at will off the sand beach. The approaches from W are clear except for the above-mentioned shoal.

(253) Cape Peirce is an important resting area (haulout) for Pacific walrus and nesting area for seabirds. Operating a boat in a manner which results in disturbing, harassing, herding, hazing or driving of walrus is prohibited under provisions of the Marine Mammal Protection Act. To ensure that walrus are not disturbed, marine vessel operators are requested to avoid transiting or anchoring within 0.5 mile of the Cape Peirce walrus haulout.

Charts 16300, 16006, 16305

(254) **Kuskokwim Bay** and **Kuskokwim River** open into the Bering Sea N of the entrance to Bristol Bay. The bay, filled with many flats, and hard steep-to shoals, is entered between Cape Newenham and **Cape Avinof**, 93 miles NW.

(255) The channels through the bay are not always apparent by the surface indications of the water. At times the channels will be smooth with rips on the shoals, and at other times the reverse will be true. The edges of the channels are often marked by long lines of foam, but occasionally the foam extends across the channels; it is well to approach these lines with caution. Navigation is recommended only at low water, when the mudflats are visible, enabling the channels between them to be followed. Because of the inequality of the tides, a vessel grounding at high water may not be refloated for several days.

(256) The 40-mile approach through **Eek Channel** to Kuskokwim River is a maze of shifting sandbars, both visible and covered, and blind channels. The channels in the bay and river undergo constant change from year to year, because of the action of the sea, currents, and ice; extreme caution and continuous soundings are necessary.

(257) The procedure usually followed is for a small pilot boat from Goodnews Bay to precede the vessel through these waters, constantly feeling out the channels and sounding.

(258) During S storms a heavy sea makes up the bay nearly to Eek Island, at the head of the bay, and vessels caught on a shoal are in danger of breaking up.

(259) The channel through Kuskokwim Bay and up Kuskokwim River to Bethel is marked by seasonal buoys. The markers above Kuskokwim River Buoy 12 are oil drums that are set to mark the best water. The deepest draft that should attempt to reach Bethel is about 15 feet.

(260) **Caution:** In November 1983, the Coast Guard reported that as a result of flooding in the area in May 1983, about 20 ocean shipping containers were washed into the Kuskokwim River from the riverbank at the village of Napakiak, about 12 miles SW of Bethel. Reports indicate that several of the containers sank in the river near the village, and the remainder of the containers were carried downriver and sank. Mariners are advised to exercise caution in navigating Kuskokwim Bay and River.

(261) **Cape Newenham** is the landfall for this region, and can be approached close-to with deep water. It is the end of a peninsula formed by a series of rough sawtoothed mountains. These mountains terminate in a level plateau that forms the immediate cape. In S weather a heavy sea and tide rips occur off Cape Newenham. In 1981, during heavy N winds, the NOAA Ship MILLER FREEMAN found a good anchorage in a small cove on the S side of the cape about 0.4 mile offshore S of Jagged Mountain in 10 fathoms, sand and mud bottom. Satisfactory anchorage for S or E weather can be had in about 8 fathoms off the small cove on the N side of the cape and about 3.5 miles from its outer end. An aero radiobeacon (58°39.4'N., 162°04.4'W.) is shown from the N side about 3 miles E from the outer

end of the cape. About 1.3 miles ESE of the aero radiobeacon is a parabolic antenna.

(262) Cape Newenham is an important resting area (haulout) for Pacific walrus and nesting area for seabirds. Operating a watercraft in a manner which results in disturbing, harassing, herding, hazing or driving of walrus is prohibited under provisions of the Marine Mammal Protection Act. To ensure that walrus are not disturbed, marine vessel operators are requested to avoid transiting or anchoring within 0.5 mile of the Cape Newenham walrus haulout.

(263) **Jagged Mountain** is a well-defined peak, the highest of the Cape Newenham group. Viewed from N, its slopes appear jagged.

(264) **Security Cove**, 9 miles ENE of Cape Newenham, is a good anchorage except with NW winds; the usual summer gales are SE. The bottom is even and shoals gradually. The best anchorage in 3½ fathoms, mud bottom, is about 0.8 mile NE of Castle Rock and on the range of Castle Rock and the first promontory SW. Water can be obtained from a stream which enters the cove. There is also good anchorage in 2 fathoms with good holding ground in the middle of the bight on the SW side of Castle Rock. This anchorage is less affected by the ground swell making along the coast from Cape Newenham than the anchorage in Security Cove.

(265) **Castle Rock**, the SW entrance point of Security Cove, is a small prominent headland, 260 feet high, joined to the land by a low neck. At the NE entrance point of Security Cove is a conspicuous pinnacle rock, 169 feet high, covered with light tundra.

(266) **Chagvan Mountain**, between Security Cove and Chagvan Bay, is smooth shaped and terminates in two high rounded knobs.

(267) **Chagvan Bay** has a narrow shoal entrance. Inside it is very shoal and cut up by bars that are bare at low water.

(268) **Red Mountain**, just S of Goodnews Bay, is a reddish color and conspicuous. From N it appears as a long ridge with the highest part at its N end.

(269) **Goodnews Bay** is shoal except for a channel with depths ranging from 1¼ to 12 fathoms that leads through the entrance to a point about 1 mile inside. This channel affords good anchorage, either in the middle of the entrance or up to 0.8 mile inside the bay on a line approximately NE of the S tangent of North Spit. The diurnal range of tide is 8.9 feet. Inside the entrance the strength of the tidal currents reaches a maximum of about 2.5 knots in a direction parallel to the axis of the channel. (See Tidal Current Tables for predictions.) Along the NE shore of South Spit the ebb current is very strong, and during the flood an eddy sets N along this shore. The holding ground is good. Small craft can select from the chart a place that affords the best shelter. A restricted anchorage for small vessels is about 1 mile S of the S entrance point, but local knowledge is necessary for its use. The sea from the outside is broken by the shoals off the entrance and does not reach the anchorage. With S or E winds, tide rips dangerous for small craft occur in the channel. The spits at the entrance are shingle and steep-to.

(270) **Platinum**, at the inner end of the spit on the S side of the entrance of Goodnews Bay, is the headquarters of a mining company and of most of the commercial activity in this area. The village has semiweekly airmail service during the summer and weekly service during the winter; an airplane landing strip is here. Radiotelephone and radiotelegraph communications are maintained.

(271) Groceries, general supplies, petroleum products, and water are available at Platinum. The small-boat basin just S of the oil-storage tanks on the NE side of South Spit can be entered only at high water as the entrance bares at low water. A road leads from the village to the storage tanks and boat basin. The platinum mines are about 15 miles SE of the village.

Pilotage, Goodnews Bay

(272) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska.

(273) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General,** (indexed), chapter 3, for the pilot pickup stations and other details.)

(274) Vessels using Southwest Alaska Pilots Association pilots and en route to Goodnews Bay contact the pilot boat by calling "GOODNEWS BAY PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

(275) **Beluga Hill** is a prominent conical hill, 924 feet high, with a steep, rocky face that rises abruptly from the N side of Goodnews Bay. Although lower than the mountains behind it, the hill usually stands out prominently from all parts of Kuskokwim Bay.

(276) To enter Goodnews Bay from a point about 2.5 miles S by W of the entrance, stand in on the NE-SW range on course **037°** until the E-W range, nearing **090°30'**, closes; then steer **000°** for about 0.7 mile or until abeam of W tangent of the spit; then follow South Spit at a distance of 0.25 mile, and cross the entrance to the small-boat anchorage.

(277) To go to the anchorage in the N part of the bay, round North Spit at a distance of 300 yards and steer **312°** for the high bluffs on the W side of the bay. Hold this course for about 2 miles, or until the E side of Beluga Hill is in range with the flat-topped mountain just

back of Goodnews Bay village. Then head up to Beluga Hill and hold the range until up to the anchorage under the mountain.

(278) About 6 feet of water will be found here at low tide. In 1913 the survey ship YUKON was at anchor here during a N gale. There is no protection in S or E weather. A stream enters the bay here. The bay has a good shingle beach.

(279) It should be noted that this route has not been surveyed, and there may be, in places, less than 6 feet of water at low tide. This route should be used with caution and only on a rising tide. Keep sounding constantly. On the bluffs at the foot of Beluga Hill is a cabin.

(280) The UNITED, drawing 16 feet, was taken into Goodnews Bay. Good anchorage is reported in 7 to 11 fathoms, 2 miles NNE from the bay entrance on line to Beluga Hill. This indicates that deep water can be carried farther into the bay in the main channel than is indicated on the chart.

(281) **Goodnews Bay (Goodnews)** is a small village with a school at the head of Goodnews Bay. The channel to the village is shallow and winding so that local knowledge is desirable, but can be followed by small boats at low water when the bars are visible.

(282) **Carter Spit** (59°19.0'N., 162°00.0'W.), on the E side of Kuskokwim Bay, is a low sandspit about 4.5 miles long and from 50 to 300 yards wide. Carter Spit encloses **Carter Bay**, which is a wide area of shoals and mudflats. Around the end of the sandspit a narrow channel is scoured out, affording anchorage for launches and small craft, but without protection from N. A small stream, known as **Indian River**, flows into the E side of Carter Bay near two abandoned cabins formerly called **Carter**. Water can be obtained by boats from Indian River at high water.

(283) **Explorer Mountain** is the highest peak N of Goodnews Bay. From S it appears as a long ridge, and is recognized by three deep gulleys on its side. From W it appears as a pyramid peak, the highest of the group.

(284) **Tooth Mountain**, a flat-topped mountain in the front range, has a sharp, rocky pinnacle on the N edge of its summit. It is easily recognized from the vicinity of Carter Spit.

(285) **Figure IV Mountain** is a sharp peak in the front range E of Jacksmith Bay. The deep ravines on the side of this mountain form a Roman numeral IV, that is conspicuous from W when the ravines are filled with snow. In the latter part of the summer, the snow disappears from the ravines.

(286) **Cone Mountain** is a large conical mountain in the first range.

(287) **Yukon Hill** is low but is the N end of the front range paralleling the coast; it is visible from the entrance of Eek Channel. From W the hill is not distinguishable, as it has the receding range for a background.

(288) **Thumb Mountain** is a fairly sharp summit in the range that recedes from Jacksmith Bay. From off Quinhagak it resembles a huge thumb placed on a high flat mountain plateau. As Eek Island is approached, the mountain appears as a less distinctive ridge.

(289) **Jacksmith Bay**, the large indention 14 miles N of Carter Spit, is bare at low tide.

(290) **Quinhagak**, 66 miles N of Cape Newenham, is difficult to approach by water because of the great mudflats bordering its shores. Launches can enter the river here only at the highest tides, and even small craft can hardly get within sight of the village and remain afloat at low water. Supplies are landed with great difficulty, because of the extensive flats and their exposure. Quinhagak has a Moravian mission, a store, and a school. Radiotelegraph communications are maintained. A limited amount of supplies may be procured. The church steeple is sometimes visible from Eek Channel. **Kanektok River**, entering Kuskokwim Bay at Quinhagak, runs fine clear mountain water at all stages of the tide.

(291) **Warehouse Bluff**, a long dark-colored bluff about 11 miles NW of Quinhagak, is an important landmark, as it is the first land on the E bank to be sighted when ascending Eek Channel. No objects on the W shore are visible until approaching the head of Eek Channel.

(292) **Warehouse Creek**, 2 miles above Warehouse Bluff, is deep and can be approached through a long tortuous channel that can be followed by small craft when the mudflats are bare. Small craft may find shelter here. The greatest range of tide in the bay occurs in the vicinity of Warehouse Creek. Inside the creek there is just swinging room for a 75-foot vessel riding to 15 fathoms of chain.

(293) In the early days trading schooners ascended the bay only to Warehouse Creek. Natives and traders from various bay and river points assembled here to await the coming of the schooner. At one time some small warehouses were built here, but no trace of them now remain.

(294) **Kuskokwak Creek** flows into the E side of the bay 4 miles S of Beacon Point. It is approached through a short channel across the flats and affords a good shelter for launches and other small craft. Just inside the mouth of this creek is a depth of 4 fathoms.

(295) At **Cape Avinof**, on the W side of Kuskokwim Bay, the E shore of the Bering Sea turns NW.

(296) **Kwigillingok** is a native village on the W side of the bay near the mouth of the Kwigillingok River. The approach to Kwigillingok is unsurveyed. Seasonal, unlighted oil drums mark the river channel and its approaches but pilotage or local knowledge is required

due to constantly changing conditions. In 1994, reported depths in the river channel to the village and the buoyed approach were 3-12 feet. There are no piers or docks in the village so small boats tie off the bank or beach themselves. Pilotage can be arranged by contacting "MAMIE 2" or "Council office" on VHF-FM channel 22. Telephone, mail, fuel, groceries, outboard motor repair, and a health clinic are available in the village.

(297) **Beacon Point**, 12 miles N of Warehouse Bluff, is flat and barely above storm high water. A line between Beacon Point and **Popokamiut**, a native fishing village on the W shore opposite Beacon Point, is considered the dividing line between Kuskokwim River and Kuskokwim Bay. The W shore of Kuskokwim Bay has not been surveyed.

(298) **Eek Island** is a grass-covered mudflat cut up by deep sloughs, and is covered by the higher tides. The island is a feeding ground for many thousands of ducks and geese.

(299) **West Point** is a fishing camp on the W bank of the river just above Eek Island. The mudbank making out from West Point has extended itself considerably since the time of the survey.

(300) **Eek River** is a large tributary flowing into the Kuskokwim River on its E side just above Eek Island. It is navigable by launches for 15 to 20 miles. The river rises in the mountains about 60 miles distant; its waters are muddy and silt laden.

(301) **Eek**, on the E side of the Eek River about 8 miles by boat from its mouth, is a large Indian village with a general store and school. Daily radio schedules are maintained with Bethel. Limited supplies of gasoline and canned goods are available.

(302) **Bethel**, 65 miles up the Kuskokwim River, is considered the head of ocean navigation. From here river boats operate to points on the upper river. The diurnal range of tide is 4.0 feet, but the stage of the river influences the depth.

(303) Bethel Small Boat Harbor has berthing space for approximately 100 vessels. In August 2004, 3.1 feet was available in the access channel with shoaling to 2 feet along the S edge at the entrance and 3.5 feet was available in the basin with shoaling near the boat ramps. An overhead power cable with a clearance of 35 feet crosses the access channel to the small boat harbor.

Weather, Bethel Vicinity

(304) The two main topographical features affecting Bethel's climate are (1) the Bering Sea, which is about 100 miles (185 km) to the W and SW; and (2) the Kilbuck Range of mountains, about 40 miles (74 km) to the E and SE. This range, averaging about 4,000 feet (1220 m) in height, extends roughly in a N-S direction in that part nearest to Bethel. Some 160 miles (296 km) SE of the Kilbuck Range, the Aleutians, extending in a NE-SW direction, provides an additional natural barrier to many of the storms originating on the outward end of the Aleutian Chain and moving out through the Gulf of Alaska. Both ranges tend to direct some of the storms NE into the Bering Sea, and thus directly affect the Bethel area. During invasions of such storms, it is not uncommon for wind velocities to exceed 43 knots. Gales occur during the winter months but are unheard of during the months of April through August. Maximum speeds usually accompany NE winds in the winter and SE winds in the summer. During the winter, strong S winds tend to be considerably affected by the mountains to the S, producing at times, a pronounced foehn (chinook) effect. Temperatures have risen almost 50°F (28°C) in less than 24 hours under these conditions.

(305) Bethel's climate is somewhat more maritime than continental in character, which tends to modify daily temperature extremes during most of the year. However, there are usually two periods during the year when the area becomes affected by continental climatic influences. In June and July, temperatures in the area rise noticeably under the influence of warmer continental air. Around the latter part of December and early January, cold, clear continental air becomes quite dominant, and Bethel's climate becomes quite similar to other areas farther inland. Extremes of temperature registered during these periods of dominant continental type climate range 134°F (74°C), from -48°F (-44.4°C) in January 1989 to 86°F (30°C) in July 1951 and again in June 1959. Average temperatures through the entire winter season, however, are considerably higher than those experienced in the Alaska interior, and temperatures for the entire summer season average considerably cooler than in the Alaska interior. The average annual temperature is 30°F (-1.1°C). The mean daily maximum in July is 62.4°F (16.9°C), while the mean daily minimum is 47.8°F (8.8°C). The coolest month, January, has a mean daily maximum of 12.7°F (-10.7°C) and a mean daily minimum of -0.6°F (-18.1°C). Annual precipitation averages nearly 17 inches (432 mm) and has ranged from 39.47 inches (1002.5 mm) in 1951 to an annual minimum of 7.29 inches (185.2 mm) in 1976. August is usually the wettest month, with an average of slightly over 3 inches (76 mm) of precipitation. Thunderstorms are rare, the average being about two a year. The few thunderstorms that do occur are generally short in duration, but rather severe. They usually develop and move out of the NE during June and July. Snowfall averages about 53 inches (1346 mm) a year and has fallen in every month but July and August. On average, 142 days in a year see snowfall.

(306) (See page 523 for **Bethel Climatological Table.**)

(307) At Bethel there is a large Alaskan Native Health Service Hospital, a National Guard Armory, a Moravian mission, several churches, hotels, and stores that are the distributors for the Kuskokwim district. Direct telephone communication, provisions, gasoline, and fuel oil are available. A limited amount of coal is kept on hand.

(308) A large well-equipped airfield with a weather station and a FAA flight service station is 3 miles W of Bethel and is serviced by an all-weather road. Daily airmail and transportation services with Anchorage are maintained.

(309) Communication between Bethel and the numerous outlying villages is by floatplanes.

(310) Ocean vessels make several trips during the summer between Seattle and Bethel, transporting freight and equipment that are distributed from Bethel over a large area. A considerable amount is shipped upriver on barges and river steamers to the many native villages along the river.

(311) At **Aniak**, 125 miles from Bethel by river steamer, is an airfield. Limited supplies of gasoline, fuel oil, and provisions are available. General stores and a hotel are in the village.

(312) Radiotelephone and radiotelegraph communications are maintained.

(313) **McGrath**, 400 miles above the mouth, is the head of navigation on the Kuskokwim River.

(314) Radiotelephone and radiotelegraph communications are maintained.

Routes

(315) Enter Kuskokwim Bay about 2 miles W of Cape Newenham, and make good a **028°** course for about 6 miles until the cape bears **190°**; thence steer **010°** with Cape Newenham directly astern for about 18 miles until Beluga Hill bears **065°** and Red Mountain **121°**. From this position, steer **341°** for about 13 miles to a position 4 miles **256°** from the elbow of Carter Spit.

(316) In thick or hazy weather a route nearer the coast may be taken as follows: Pass 0.5 mile off Cape Newenham and Bird Rock, and then make good a **070°** course for about 6.5 miles until Castle Rock, the SW headland of Security Cove, bears **177°**. Strong tidal currents occur along the N shore of Cape Newenham. From here steer **357°** with Castle Rock astern for 14 miles until the summit of Red Mountain is abeam, thence **341°** for 19.5 miles to a position 4 miles **256°** from the elbow of Carter Spit.

(317) Next steer **302°** for 5.5 miles with Beluga Hill in range with Pyramid Mountain astern, then head up the channel on a **006°** course.

(318) Vessels should arrange to make this point at the last of the ebb, and go up the channel with the flood. After heading on the **006°** course, the long shoal on the E side of the channel should be made out, either heaping or breaking. It is only with a very smooth sea that this shoal is not in evidence at low water. After continuing on this course for about 10 miles, the long shoal on the W side of the channel should be made out, either heaping or breaking. This shoal should be followed at a distance of about 1 mile until its N extremity is reached. Here it becomes a mudflat, bare at about half tide, of a yellowish color with deep water close-to. This flat is the leading mark for entering Eek Channel, therefore it should always be made at low water.

(319) From here, the track veers W and follows the flats on the W side of the channel on a course of about **000°** for some 13 miles.

(320) It is reported that extensive changes have taken place N of 59°36'N. The chart is no longer a sufficient guide with respect to the channels.

(321) In proceeding upriver the passage W of Eek Island is used. A crossover from Eek Channel to the W channel is made in an area subject to considerable change. It is generally necessary to wait for nearly high water before making a crossover to the W channel. Navigation in this region is difficult, and a pilot and his launch should be employed. There are no landmarks visible; if buoys are in place the crossover is much easier.

Pilotage, Bethel

(322) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska. (See **Pilotage, General** (indexed), chapter 3, for the pilot pickup stations and other details.)

(323) **E side of Eek Island.**–The channel along the N side of Eek Island, once used by power schooners, has shoaled until it is now bare at low water and is used only by small fishing boats. Small vessels now go as far as Apokak Creek. From Beacon Point the channel follows the E bank of the river.

(324) **Passage W of Eek Island.**–Once in the W channel, follow the W bank of the river SW of Eek Island for 4 miles. The course then bears out into the river towards Eek Island. From here the channel crosses to the E bank and continues to Bethel, crossing back and forth many times. There are no leading marks, and at some of the crossings it is necessary to wait for high water. A pilot is necessary.

(325) In 1994, the Coast Guard Cutter IRONWOOD reported good anchorage can be made just off Popokamiut, on the W side of the mouth of the river, in hard mud bottom.

(326) Vessels coming downriver stand out to sea from abreast of Carter Spit. In entering, this track is not used because of the possibility of running up a blind channel.

Tides

(327) The diurnal range of tide is 12.2 feet at Kuskokwak Creek entrance and 4.0 feet at Bethel.

Currents

(328) The currents of Kuskokwim Bay and River are strong, attaining velocities of 5 knots at times. A strong tidal current sweeps past Cape Newenham, setting approximately N and S. Along the N side of the cape, tidal currents of about 1 knot have been observed setting NE and SW. In general, the currents set in directions parallel to the axes of the channels between the shoals. In the channel leading to Goodnews Bay, about 1 mile from the N end of South Spit, flood and ebb each has a velocity of about 2.5 knots, setting NE and SW, respectively. In the deep channels off Jacksmith Bay the flood current has a velocity usually of about 2 to 2.5 knots at strength, and the ebb from 2.5 to 3 knots. In the vicinity of Apokak Creek, the strongest current observed was 3.5 knots. The flood current is felt only about as far as Bethel.

(329) By arriving at the entrance to Eek Channel on the last of the ebb, a favorable current can be carried nearly to Bethel, providing there are no delays.

(330) (See Tidal Current Tables for predictions in Kuskokwim Bay and River.) Variations from the predicted times and velocities, because of freshets and winds, may be expected.

Weather, Eek Island Vicinity

(331) The best weather usually occurs in March and April. During the summer, SE to SW gales are frequent and last from 2 to 5 days. These storms gradually blow themselves out and are generally followed by a few days of good weather. In the early fall, N winds are frequent and are usually accompanied by clear skies. After mid-September, strong gales become frequent and prolonged.

(332) Water can be obtained from small streams in Security Cove, Goodnews Bay, and Carter Bay. In the vicinity of Eek Island, the river water is fresh at all stages of the tide; it is very muddy, but the silt settles readily.

Chart 16380

(333) The **Pribilof Islands**, in the Bering Sea about 200 miles NW of Unimak Pass, consist of St. Paul, St. George, Otter, and Walrus Islands; the latter two are small and uninhabited. St. Paul and St. George have the largest and most numerous fur seal rookeries in the world. The group is under the jurisdiction of the National Marine Fisheries Service and is patrolled during the sealing season by vessels of the U.S. Coast Guard, under provisions of the international treaty governing sealing. From June 1 to October 15, the fur seal breeding and birthing season, landing is forbidden at the rookeries in the vicinity of English Bay, Reef Point, Lukanin Point, Polovina Point, and Northeast Point on St. Paul Island. Walrus and Otter Islands are bird reservations, landing is prohibited at all times, unless a permit is obtained from the National Marine Fisheries Service.

(334) Radiotelephone and radiotelegraph services are maintained on St. Paul Island and St. George Island. In addition, interisland radio and satellite communications are maintained.

(335) A supply vessel makes several trips a year between Seattle and the Pribilof Islands (St. George and St. Paul).

(336) There are no landlocked harbors about the islands, but safe anchorage is always available on the lee sides. Residents of St. Paul Island say that the prevailing wind during the summer is from the NE, which makes Village Cove on St. Paul Island a good anchorage in all but severe SW winds. The bottom in Village Cove is black sand, and the holding ground is good. During SW winds good anchorage is available in Lukanin Bay on the SE side of St. Paul Island.

(337) The following regulations are from **50 CFR, Wildlife and Fisheries:**

Part 216–Pribilof Islands

Subpart G–Administration

§216.81 Visits to fur seal rookeries.

(338) From June 1 to October 15 of each year, no person, except those authorized by a representative of the National Marine Fisheries Service, or accompanied by an authorized employee of the National Marine Fisheries Service, shall approach any fur seal rookery or hauling grounds nor pass beyond any posted sign forbidding passage.

§216.82 Dogs prohibited.

(339) In order to prevent molestation of fur seal herds, the landing of any dogs at Pribilof Islands is prohibited.

§216.83 Importation of birds or mammals.

(340) No mammals or birds, except household cats, canaries, and parakeets, shall be imported to the Pribilof Islands without the permission of an authorized representative of the National Marine Fisheries Service.

§216.84 (Reserved)

§216.85 Walrus and Otter Islands.

(341) By Executive Order 1044, dated February 27, 1909, Walrus and Otter Islands were set aside as bird reservations. All persons are prohibited to land on these islands except those authorized by the appropriate representative of the National Marine Fisheries Service.

§216.86 Local regulations.

(342) Local regulations will be published from time to time and will be brought to the attention of local residents and persons assigned to duty on the Islands by posting in public places and brought to the attention of tourists by personal notice.

§216.87 Wildlife research.

(343) (a) Wildlife research, other than research on North Pacific fur seals, including specimen collection, may be permitted on the Pribilof Islands subject to the following conditions: (1) Any person or agency, seeking to conduct such research shall first obtain any Federal or State of Alaska permit required for the type of research involved.

(344) (2) Any person seeking to conduct such research shall obtain prior approval of the Director, Pribilof Islands Program, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, 1700 Westlake Avenue North, Seattle, Wash. 98109, by filing with the Director an application which shall include:

(345) (i) Copies of the required Federal and State of Alaska permits; and

(346) (ii) A resume of the intended research program.

(347) (3) All approved research shall be subject to all regulations and administrative procedures in effect on the Pribilof Islands, and such research shall not commence until approval from the Director is received.

(348) (4) Any approved research program shall be subject to such terms and conditions as the Director, Pribilof Islands Program deems appropriate.

(349) (5) Permission to utilize the Pribilof Islands to conduct an approved research program may be revoked by the Director, Pribilof Islands Program at any time for noncompliance with any terms and conditions, or for violations of any regulation or administrative procedure in effect on the Pribilof Islands.

Weather, Pribilof Island Vicinity

(350) Fogs are especially thick and prevalent in this vicinity in the summer, and navigation is attended with difficulty and danger. A navigator should plan to make landfalls in the Pribilof Islands during the summer based on no land being visible. One annoying characteristic of the area is very thick fog accompanying strong winds. Logs from survey vessels indicate that a typical summer day in the Pribilof Islands is as follows: Dense fog at daylight, vessels anchored 200 yards distant not visible, calm sea, light airs; by noon intermittent sun, a wet drifting fog, gentle breeze; by evening a dense fog, winds increased to force 6. Dense fog with visibility less than 0.5 mile is more common around St. Paul Island than around St. George Island. An unusual characteristic off North Anchorage, St. George Island, was clear visibility along the shore accompanied by dense curtainlike fog to seaward.

(351) Winds do not continue to blow from the same quarter for any length of time. From December through April winds blow from the NE more than from the other directions. After September 1, gales are frequent and violent, and blow from all directions.

Ice

(352) The Pribilofs are near the S limit of the ice in Bering Sea. On rare occasions the icefields extend as far as 35 miles S of St. George Island. In 7 years of National Weather Service ice records at St. Paul Island, no sea ice at all was reported in 3 years. In the other 4 years, navigation remained easy throughout 1 year and became restricted to full-powered vessels for short periods in March and April of 3 years; at no time did navigation become suspended or require the use of an icebreaker.

(353) In 1974, a pinnacle was reported 68 miles WNW of St. Paul Island in 57°39.2'N., 173°24.0'W. (see chart 16006). Depth of water over the pinnacle is not known.

Chart 16381

(354) **St. George Island**, the southernmost of the Pribilof Islands, consists mainly of high volcanic hills and ridges, and its entire coast is a precipitous cliff except for a few miles on the N side and short intervals at Garden Cove and Zapadni Bay. The E and W extremities of the island, **Tolstoi Point** and **Dalnoi Point**, are bold promontories. **High Bluffs**, on the N side of the island, 1,012 feet high, is a prominent landmark and is visible from St. Paul Island, a distance of nearly 40 miles, on a clear day.

(355) **St. George Harbor**, on the SE side of Zapadni Bay, is the only harbor on St. George Island. The channel is

dredged and in 1993-June 2002, had a controlling depth of 17 feet. The entrance is protected by breakwaters and marked by a 076° lighted range and daybeacons. The N breakwater is marked by a light. There are two docks on the E side of the basin; N dock is 60 feet and S dock is 75 feet, both with 19 feet alongside and staging areas. An additional 250 feet of moorage is provided by dolphins on the W side with 22 feet alongside. The harbormaster assigns berths (telephone 907-859-2263) and monitors VHF-FM channels 16 and 12. Water, sewage pumpout, a boat ramp, and marine supplies are available. The harbor is owned and operated by the village of St. George. Anchorage can be had at North Anchorage, Garden Cove, and Zapadni Bay, according to the direction of the wind; the anchorages are poor except with the wind directly off the land. At a distance generally not greater than 2 miles from the island the depth of the water is but little less than the surrounding sea, and in thick weather it is not safe to depend upon soundings for picking up the land unless sure of the position. Vessels should not approach the island in less than 12 fathoms of water. There are no outlying dangers except the rock awash 0.6 mile NE of East Landing, and the small reefs at Zapadni Bay and North Anchorage. A rocky shoal, covered 1¾ fathoms, is 9.3 miles **078°** from Tolstoi Point.

(356) The anchorage in **Zapadni Bay**, on the SW side of the island, in 10 fathoms, affords shelter with winds from ENE to NNW. A reef extends about 0.2 mile offshore S of the anchorage.

(357) With N winds, a landing may sometimes be made at **Garden Cove** S of Tolstoi Point, on the sand beach. The anchorage affords shelter from NW winds, but with the exception of a small area the bottom is rocky.

Currents

(358) In the open water the tidal current is rotary, turning clockwise. Along the N and S shores of the island the current in general sets E on the flood and W on the ebb. The largest velocity observed over a period of about 6 days in July and August was about 1.5 knots. With opposing wind and current, tide rips occur off Tolstoi and Dalnoi Points. These rips are not heavy enough to be of any consequence, except that to strangers they appear to be breakers. The water is deep off both points, which can be passed close-to with safety.

(359) The approach to **North Anchorage** is marked by a private marker about 0.5 mile N of St. George. The most prominent landmarks in the village of **St. George** are the white roofs of the quadrangle of sheds, low down at the water's edge. The roofs loom up first through the fog. Also conspicuous is a tight group of buildings on the slope and ridge back from the beach. Most easily identified is the Russian Orthodox church whose bell tower has a green onion-shaped roof topped by a white St. Andrew's cross.

(360) Vessels should keep the street which extends through the village bearing **164°**. Good anchorage will be found about 700 yards from the landing. There is swinging room for a 400-foot vessel riding to 45 fathoms of chain.

(361) The landing is a square block of reinforced concrete next to a cutting in the rocks. The area around the landing, and for about 75 feet to seaward, practically bares at extreme low water. The landing can be used by small shallow-draft boats 3 hours on either side of high water. A launching ramp is at North Anchorage.

(362) **East Landing**, just NE of the village, is better protected from a W swell. A ledge awash is a short distance off the landing. If desired, a boat will come out to anchored vessels when landing is practicable.

Local magnetic disturbance

(363) Differences of as much as 11° from the normal variation have been observed on St. George Island.

Pilotage, St. George

(364) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska.

(365) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General** (indexed), chapter 3, for the pilot pickup stations and other details.)

(366) Vessels using Southwest Alaska Pilots Association pilots and en route to St. George can contact the pilot boat by calling "ST. GEORGE PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

(367) The U.S. Public Health Service maintains a Native Health Services clinic in the village of St. George.

Communications

(368) St. George Airport provides air services four times a week. Peninsula Airways Aircraft Charter will provide air transportation in an emergency.

Chart 16382

(369) **Otter Island**, off the S side of St. Paul Island, has an abrupt bluff 288 feet high at its SW end, slopes gradually to the N, and rises again in a crater, about 141 feet high, at its extreme E end. Foul ground, marked by kelp, extends about 0.8 mile from the island on its S, SW, and N sides. The N side, from **Crater Point** to **Northwest Reef**, is clear of dangers. Probably the best

anchorage near the island is in 9½ fathoms, black sand and broken shells, with the NE extremity of Crater Point bearing **185°**, distant 0.5 mile. This island must be approached with great caution in thick weather, and at all times a vessel should keep out of kelp. A 6-fathom (11.0 m) shoal is 2.1 miles ENE of Otter Island.

(370) Between Otter Island and Reef Point, St. Paul Island, the tidal currents are strong, and with heavy winds the tide rips are dangerous especially on the ebb current. In 1976, the NOAA Ship SURVEYOR observed currents setting NW at about 2.5 knots about 2.1 miles SW of the SW end of Otter Island.

(371) **Walrus Island**, off the E side of St. Paul Island, is low, about 39 feet high, level on top, and composed of irregular masses of volcanic rock. It is very hard to pick up in thick weather. It is about 0.4 mile long and 0.1 mile wide. Anchorage in emergency situations can be had on either side of it, 0.3 to 0.5 mile offshore, in 10 to 15 fathoms. Landing can be made with smooth water, the best place being a small cove at the SW corner. The island is a bad place to make in a fog. Parts of Otter and Walrus Islands are covered with sea birds in the breeding season.

(372) Walrus Island is a Seller sea lion rookery site. There is a 3-mile vessel exclusionary zone around the entire island. (See **50 CFR 223.202**, chapter 2, for limits and regulations.)

Current

(373) Current observations made in July and August W of Walrus Island show that the current is rotary turning clockwise, with velocities exceeding 2 knots at times.

(374) **St. Paul Island**, the northernmost of the Pribilof Islands, is about 235 miles NW from Unimak Pass. The W and SW parts of St. Paul Island are high and mountainous, with precipitous cliffs at the coast. The rest of the island is a comparatively low, rolling plateau, with a number of extinct volcanic peaks scattered over its surface. **Bogoslof Hill**, 590 feet high, a conical crater near the center of the island, and **Polovina Hill**, double-peaked and 470 feet high, near the E end, are conspicuous and the best landmarks in clear weather when coming from S. From this latter hill the island stretches away, in a low, narrow neck to **Hutchinson Hill**, about 100 feet high, on **Northeast Point**. W of **Lukanin Bay** the coast of the S side of the island is rocky, with bluffs at the points. The shore of the rest of the island is generally a sand beach, with rocks in the vicinities of the seal rookeries. A tall loran tower is about 2.2 miles NNE of the village of St. Paul, and an aerolight is about 1.1 miles E of the tower.

(375) A rocky ledge covered 2.4 fathoms (4.4 m) with no visible kelp is 5 miles NE of Northeast Point. Kelp-marked reefs extend about 0.4 mile SE from the two low points S of Northeast Point. A dangerous ledge with two rocks covered 1.4 fathoms is 1.1 miles N of Hutchinson Hill. With a moderate swell the sea breaks over these rocks.

(376) On the N side of St. Paul Island, depths of 5 fathoms or more are 1 mile offshore.

(377) A shoal covered 2 fathoms is 7.5 miles W of St. Paul Island.

(378) Breakers extend 0.3 mile or more off **Southwest Point**.

(379) A dangerous ledge, usually marked by breakers, extends 0.6 mile SW and S from **Reef Point**, the S point of the island.

(380) **Sea Lion Rock**, about 0.3 mile S of Reef Point, is prominent when approaching the point from an E or W direction.

(381) A reef extends about 0.3 mile off **Stony Point**, the NE point of Lukanin Bay.

Pilotage, St. Paul

(382) Pilotage, except for certain exempted vessels, is compulsory for all vessels navigating the waters of the State of Alaska.

(383) The Bering Sea is served by the Alaska Marine Pilots and Southwest Alaska Pilots Association. (See **Pilotage, General** (indexed), chapter 3, for the pilot pickup stations and other details.)

(384) Vessels using Southwest Alaska Pilots Association pilots and en route to St. Paul can contact the pilot boat by calling "ST. PAUL PILOT BOAT" on VHF-FM channel 16 or on a prearranged frequency between pilot and agent/vessel.

Anchorage

(385) The usual anchorage at St. Paul Island is W of Village Cove between Zapadni Point and Reef Point in the vicinity of the 10-fathom curve. The bottom, in general, is sandy, but rocky bottom will be found in the vicinity of Zapadni Point and Tolstoi Point. Anchorage can be found NE from Reef Point, off **Black Bluffs** and East Landing, and in Lukanin Bay.

(386) Lukanin Bay has a sandy bottom and is used when W swells make the Village Cove anchorage undesirable. From the Village Cove anchorage the village of St. Paul is obscured by a bluff although it is in full view from the Black Bluffs anchorage.

(387) In the spring (April-May) as the ice edge moves N, the winds can radically change its configuration. Vessels anchoring in Village Cove or other areas around the Pribilof Islands should maintain a careful ice watch so as not to become entrapped.

(388) Vessels should not attempt to ride out a gale at anchor near the islands, unless to leeward and well

sheltered. The surf is apt to make quickly and is dangerous on the weather side of the island.

(389) Prominent in the approach to the anchorage off **Village Cove** are the three large steel tanks on a bluff just W of the village. Also on the bluff, just to the N, are eight smaller white tanks. Vessels should steer **082°** for the center of the three large steel tanks and anchor in about 8 fathoms with Reef Point and the center of Sea Lion Rock in range.

(390) **Zapadni Point, Tolstoi Point**, and **Reef Point**, 2.5 miles WNW, 0.6 mile NW, and 1 mile SW of Village Cove, respectively, are the best radar targets in the area at a range of 5 to 7 miles.

(391) In September 1993, an obstruction with an unknown depth was reported 0.7 mile SE of Zapadni Point in about 57°08'12"N., 170°19'54"W.

(392) Village Cove is protected by breakwaters marked by lights. The harbor is a refuge for the fishing fleet of the Bering Sea. In May 2006, 18 feet was available in the entrance channel. The harbor has three main docks with depths of 9.5 to 23 feet alongside and deck heights of 11 feet. The small boat float has a depth alongside of 15 feet. Keep close to shore; the harbor shoals rapidly in the NE section. Caution should be used when approaching the harbor as heavy swells may still break near the entrance.

(393) **St. Paul**, about midway along a peninsula extending from the S side of St. Paul Island, has small wooden dwellings painted white with dark-colored roofs, a church, hotel, a small hospital, several large buildings, and a machine shop with limited facilities. The hospital patients requiring surgery are transferred to Anchorage by jet medevac.

(394) A commercial airline provides weekly mail and passenger service to and from Anchorage via Cold Bay or Dutch Harbor when weather permits. A weather station and a loran station are on St. Paul Island. The weather station monitors CB channel 9, and the loran station monitors VHF-FM channel 16 (156.80 MHz).

(395) Landing is forbidden at the fur seal rookeries on St. Paul Island during the breeding season, June 1 to October 15.

Weather, St. Paul Vicinity

(396) The climate is typically maritime, resulting in considerable cloudiness, heavy fog, high humidity, and rather well restricted daily temperature ranges. Humidities remain uniformly high from May to late September, and during the summer period there is almost continuous low cloudiness and occasional heavy

fog. June, July, and August are the foggiest months. On average, 205 days in a year have fog reported. The differences between average maximum and minimum temperatures for the entire year are only slightly above 8°F (4°C). Temperatures remain on the cool side even during the summer, and the highest temperature on record is 66°F (18.9°C) in August 1987. Extreme highs in summertime usually range around the middle fifties (12° to 14°C). Although record low readings fall well below the zero mark (<-18°C) and each month from December through April have seen below zero (<-18°F) readings, such extremely cold days are rather rare. On the average only 5 days each winter season have temperatures falling below the zero mark (<-18°C). The lowest temperature on record is -19°F (-28.3°C) in March 1971.

(397) Despite an environment of high humidities, and days with precipitation numbering 320 for a given year, precipitation on St. Paul Island is surprisingly light. The annual average is slightly below 24 inches (610 mm), which is just below the average for Alaska as a whole. The greatest 24-hour precipitation on record fell slightly short of 2 inches (51 mm, October 1949). The wettest year on record, 1964, had 36.60 inches (929.6 mm) of precipitation and the driest year, 1977, saw only 9.82 inches (249.4 mm) for the year. April is generally the driest month, with a gradual increase of precipitation until a mean monthly total of over 3 inches (76 mm) is reached during August and slightly below for September and October. This is followed by a gradual decrease during the succeeding months until the return of April. On average, 165 days per year record snowfall and the **Weather Service Office (WSO)** averages about 56 inches (1422 mm) in a year. March is the snowiest month averaging ten inches (254 mm) and 25 days with snow during the month. Only July, and August have been snow free. Thunderstorms are extremely rare on St. Paul Island. The only isolated occurrence ever reported was in June 1939.

(398) Frequent windy periods are characteristic of the island area throughout the year. Frequent storms occur from October to April, and these often are accompanied by gale force winds to produce general blizzard conditions. The mean wind speed for the WSO is 14 knots but the winter months average nearly 17 knots. Gales have occurred during every month except June and July. Under the influence of prolonged N and NE winds between January and April, the ice pack occasionally moves S to surround the island. During recent years, the S limit of this movement has been between St. Paul and St. George Islands, some 40 miles (74 km) to the SE of St. Paul.

(399) (See page 522 for **St. Paul Island Climatological Table.**)

Tides and currents

(400) The diurnal range of the tide at Village Cove is 3.2 feet. Around the island the current sets NW on the flood and S on the ebb, following the trend of the shore. The greatest velocity occurs at Northeast Point and between Reef Point and Otter Island. Average velocity at strength of current is 1 to 2 knots, but with continued strong winds from one direction it may increase to 3 knots.

(401) There are heavy rips around Northeast and Southwest Points, also between Reef Point and Otter Island, where they are worse on the ebb. The tides and tidal currents are greatly influenced by the winds.

Chart 16006

(402) **Nunivak Island**, in the Bering Sea near the Alaska mainland, is about 330 miles N of Unimak Pass. Dangerous shoals and uneven bottom have been reported and are shown on the chart; the island should be approached with extreme caution.

(403) From W, Nunivak Island shows gentle slopes terminating seaward in reddish cliffs 150 to 462 feet high. The highest point of the W part of the island rises to 866 feet 10 miles ESE from Cape Mohican. Near the center of the island is **Roberts Mountain**, 1,675 feet high, the highest of a group; this mountain is built up of a series of volcanic benches, the top being the steep side of a breached crater. The E end of the island is low, for the most part, except for some low hills and **Twin Mountain**, a breached crater 627 feet high.

(404) In clear weather the island generally can be made out for 30 miles from any direction. The island is inhabited by herds of reindeer.

(405) In 1899 the U.S.S. CORWIN cruised completely around Nunivak Island, following the shore and outlying islands at a distance of about 2 miles, and found general depths of 7 to 10 fathoms. The coast is generally abrupt and rocky, with numerous bights in which anchorage was found in 3½ to 7 fathoms.

(406) **Cape Mohican**, the W point of Nunivak Island, is a narrow promontory about 2 miles long. The point of the cape is a cliff 266 feet high from which the terrain descends E to 150 feet for 2 miles before ascending gradually to the higher ground inland.

(407) **Cape Mohican Light** (60°12'41"N., 167°27'28"W.), 285 feet (86.9 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark on the end of the cape.

(408) A shoal about 1 mile wide extends 5 miles 050° from Cape Mohican and has depths of 2 to 4 fathoms over it. The shoal area should be avoided until it has

been completely surveyed. The 10-fathom curve extends 7.5 miles 058° from the cape.

(409) In 1979, the U.S. Coast Guard Cutter IRONWOOD reported possible shoreline charting inaccuracies on the NW side of Nunivak Island between Cape Mohican and Nash Harbor. Until surveys are made of this area, mariners are advised to use caution when using shoreline features for navigation.

(410) **Nash Harbor**, on the N coast of Nunivak Island 16 miles E of Cape Mohican, is a good anchorage except with winds from NW through N to NE. The coast to the W of the harbor is fairly high and is backed by cliffs, while to the NE it is low. The S side of the harbor has a sand-and-gravel beach at the foot of a 30-foot bluff. The bottom slopes gradually from 10 fathoms outside Nash Harbor to the beach at the head.

(411) The harbor is 1.5 miles wide and about 1 mile in depth. The bottom is sand except near the rocky parts of the shore, and there are no indications of dangers over a large 4- to 6-fathom area in midharbor. Boats usually land off the village of **Nash Harbor**, on the W side of a creek that empties into the SW part of the harbor; however, there are boulders close to shore at this landing as well as in the cove on the W shore. The creek drains a lake, but the water is brackish because the lake level is affected by the tides. The lake freezes every winter and makes an excellent landing place for airplanes fitted with skis; it is also large enough for seaplanes to use in summer.

(412) In 1951, the survey ship PATHFINDER made the approach to Nash Harbor (see chart 16006) on course **090°** for 21 miles from a position 4.5 miles N of Cape Mohican until abeam of the harbor, then steered **180°** for midharbor to anchorage in 6 fathoms.

(413) **Cape Etolin**, 40 miles ENE of Cape Mohican, is the northernmost point of Nunivak Island. The cape is a narrow strip of land with a ridge of low hills midway along its outer part; it appears as two or more islands from a distance W. A small island is about 2 miles off the end of the cape; between are ledges. A dangerous rocky area extends W from Cape Etolin for about 1.5 miles.

(414) **Cape Etolin Light** (60°25'48"N., 166°09'38"W.), 40 feet (12.2 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark near the N tip of Cape Etolin.

(415) **Mekoryuk**, about 2 miles W of the inner end of Cape Etolin, and Nash Harbor are the only villages on Nunivak Island that are inhabited the year round. A weather station is maintained at Mekoryuk, and the village has weekly mail service by air; radiotelegraph communication is maintained.

Anchorage

(416) Anchorage can be found NW of Mekoryuk in 25 to 32 feet of water.

(417) In 1951, the PATHFINDER anchored on the W side of Cape Etolin, 4.5 miles NW of Mekoryuk, in 5 fathoms, sand bottom, on bearings **080°** to N tangent of Cape Etolin, **089°30'** to highest knoll on Cape Etolin, **122°** to center of schoolhouse, the largest building in Mekoryuk, and **246°** to N tangent of point 5.5 miles to the SW. From this anchorage the N tangent of Cape Etolin was open **001°30'** from the S tangent of Cape Vancouver. The anchorage was approached from W on a heading of **092°** for the highest knoll on Cape Etolin. The approach should be made with caution as the area shoals rapidly and the reference points are apt to be obscured by fog except during N winds. From the anchorage, a launch ran on a general course of **120°** toward Mekoryuk for 3 miles and obtained a minimum depth of 25 feet.

(418) Shoals covered 3 fathoms have been reported about 7.5 miles N and 15.5 miles NW from Cape Etolin, and a shoal covered 4½ fathoms has been reported 12.5 miles NNE from the cape; all with deep water surrounding them. Keeping Cape Vancouver bearing N of **086°**, Cape Etolin can be rounded when coming from W in 10 fathoms. With Cape Vancouver bearing **086°** or E of this bearing, considerable shoal water and irregular depths are found.

(419) **Cape Etolin Anchorage**, the bight on the E side of the cape, has fair holding ground in 2 to 5 fathoms, but is open to the NE. Near the S side, and about 0.3 mile from the head of the bight, is anchorage in 3 fathoms; the holding ground is gravel and only moderately good. Farther out, it is deeper but more exposed to the strong tidal currents and rips of **Etolin Strait**, the wide passage between Nunivak Island and the mainland.

(420) Several shoals have been reported in Etolin Strait. In 1968, the U.S. Coast Guard Cutter NORTHWIND, in transiting the strait, reported that depths in some cases were found to be greater or lesser than now charted. Until surveys are made of this area, mariners are advised to use extreme caution.

(421) In 1971, the Coast Guard Cutter STORIS observed the following conditions on the E side of Etolin Strait: Depths of 2½ fathoms were found in 59°59.0'N., 164°56.0'W. Proceeding essentially W from that position, depths increased to 5 fathoms, then quickly shoaled to 1¾ fathoms in 60°01.0'N., 165°05.0'W. The bottom was sand and mud. The 3-fathom shoal centered in 59°49.0'N., 164°55.0'W. was found in charted position. The STORIS further reported that the depths were found to be generally as noted on chart 16006 in

the area SE of the charted shoals and changes in depth were very gradual.

(422) In May 1977, the NOAA Ship MILLER FREEMAN reported shoaling to 4¼ fathoms centered in about 59°49.9'N., 165°33.0'W. Caution is advised in this area.

(423) **Cape Manning** is 15 miles SE of Cape Etolin. **Triangle Island** is 5 miles NW of Cape Manning and 2 miles from the nearest shore of the main island, with foul ground reported between.

(424) **Cape Corwin**, 20 miles S of Cape Manning, is the easternmost point of Nunivak Island. The cape is low and has a rocky shore on its N side. The two peaks of Twin Mountain are 7 miles NNW of the point of Cape Corwin and can be seen for 25 miles in clear weather.

(425) **Cape Mendenhall**, 18 miles WSW of Cape Corwin, is the southernmost point of Nunivak Island. The cape is 255 feet high and has a low rock bluff 10 to 20 feet high on its E side. A 2¾-fathom shoal is 4 miles SW of Cape Mendenhall.

(426) During a N blow in August 1951, the survey ship EXPLORER found satisfactory anchorage in 8½ fathoms about 10 miles NW of Cape Mendenhall. The anchorage is about 1.5 miles off the beach of the second bight NW of the cape and is protected from NW through N to E. As the ship approached on a NE course, the water shoaled uniformly from 14 to 8½ fathoms. The fine gray sand bottom is good holding ground. Currents along the coast had velocities estimated to be as much as 1 knot.

(427) From Cape Mendenhall the coast extends NW for about 40 miles to what may be called the SW cape of Nunivak Island. The few soundings obtained show deep water fairly close to shore, and it is apparently safe to follow the shore at a distance of 2 miles. Depths of 4¾ to 6 fathoms have been found on an extensive shoal about 10 miles off this stretch of coast.

(428) The SW cape has cliffs 100 to 150 feet high; the summit is gently sloping tundra. In the small cove E of the cape, landings can be made on the sandy beach in front of the few barabaras of **Tachikuga**, an abandoned native village. Water can be obtained from the stream just E of the abandoned village; at low water the stream is fresh to its mouth. Temporary anchorage is possible in 7 to 9 fathoms about 0.8 mile off the entrance to the cove.

(429) From the SW cape, the coast of Nunivak Island extends N for about 8 miles to Cape Mohican. Along this stretch are impassable cliffs 150 to 450 feet high, and there are no landing places. The 6-fathom curve is about 1.3 miles offshore.

Tides

(430) The diurnal range of tide at Tachikuga, on the SW side of Nunivak Island, is 4.3 feet. At Nash Harbor, on the N side, the diurnal range is 5.3 feet, and the tide occurs about 1 hour later than at Tachikuga.

Currents

(431) On the N and SW sides of Nunivak Island the current has a large diurnal inequality. NE of Cape Mohican a 4-hour series of current observations in July 1951 showed a NE current which at strength had a velocity of 1.8 knots. Observations made in June and August 1951 W of Cape Etolin showed tidal currents setting along the shore in both directions with velocities of about 1 knot at strength of current. On the E side of the island in Etolin Strait, it is stated that tidal currents are so strong that the middle portion does not freeze over in winter. (See the Tidal Current Tables for predictions off the W coast of Nunivak Island.)

Ice

(432) Navigation is difficult from mid-December to mid-May and usually is suspended from early January to late March.

(433) **St. Matthew Island** and adjoining islands are 145 miles W from Nunivak Island. They are rocky, uninhabited islands whose shores are poorly charted except for a small area between Sugarloaf Mountain and Pinnacle Island. St. Matthew Island is a succession of hills and low valleys. During the season of navigation, fog is prevalent in this vicinity. Anchorage can be made with an offshore wind on the N or S sides of the island.

(434) **Cape Upright**, the E point of St. Matthew Island, is high and vertical, and the land in its immediate vicinity is mountainous. A mountain 1,505 feet high is 0.7 mile back of the cape, and another mountain 1,280 feet high is 0.9 mile SW of the cape. Off the cape is a detached rock 25 feet high. W of the highland of the cape is a low neck, apparently of sand, and the cape might be easily mistaken for a detached island.

(435) **Glory of Russia Cap**e, the N point of St. Matthew Island, is also high and mountainous. A 1,475-foot peak is about 1.3 miles S of the cape.

(436) Numerous detached rocks along the shores of St. Matthew Island should not be approached too closely. On the island is an abundance of freshwater in streams and lakes.

(437) **Sugarloaf Mountain**, 1,380 feet high, is 11.5 miles W from Cape Upright. From Sugarloaf Mountain the coast trends about 0.8 mile SE to the westernmost point of a wide bight that extends to Cape Upright. A rock is about 350 yards S of this point.

(438) Good anchorage may be had in about 14 fathoms, sheltered from winds between SE and SW, in a bight on the E side of St. Matthew Island, about 10 miles NW of Cape Upright, with Sugarloaf Mountain bearing **220°**, and W of some rocks which show well out of the water

and should not be approached closely. Landing is difficult with any swell, as the beach is stony and steep. In 1951, the PATHFINDER anchored frequently in 9 to 10 fathoms, about 3.5 miles WNW of Sugarloaf Mountain, with broken bottom and satisfactory holding ground. The PATHFINDER also anchored in about 14 fathoms, with protection from N gales, 4 miles E by S of Sugarloaf Mountain.

(439) **Sarichef Strait** is a 2.5-mile-wide passage between St. Matthew Island and Hall Island. Tidal currents and rips were not found to be strong in 1951. The PATHFINDER obtained a least depth of 10 fathoms in two passages of the strait near the middle, but the records indicated that shoaler depths could be expected.

(440) **Hall Island**, about 3 miles N of St. Matthew Island, is 1,665 feet high and is rugged on its NE, N and W sides; the SE point is low. **Elephant Rock** is a large detached rock off **Cape Hall,** the N point of the island, and **Arre Rocks** are several smaller detached rocks off the SW side of the island. Anchorage is available in 10 fathoms in the bight on the SE side of the island.

(441) In 1993, the Canadian Survey Ship John P. Tully reported discolored water, confused and mounting seas, and being abruptly set to the E with currents of about 3 knots when passing on the E side of Hall Island about 2 miles off Elephant Rock.

(442) **Pinnacle Island**, with its spires and needle formations making a striking appearance, rises abruptly from the sea with scarcely a place for a boat landing. The N end of the island is 8 miles SSW of Sugarloaf Mountain. Pinnacle Island is 1.4 miles long, 0.3 mile wide, and rises to 1,250 feet midway of its length.

(443) An unusual submerged ridge extends from the N end of Pinnacle Island in a **021°** direction to the shore of St. Matthew Island. The ridge is about 300 yards wide between the 10-fathom curves. The least depth found in 1951 was 4 fathoms, and there were several depths of 5 fathoms. The best water over the ridge was 9 fathoms 1.6 miles SW of the point below Sugarloaf Mountain. Tide rips occur along the ridge with fresh winds.

(444) Rocks and islets 55 to 95 feet high are off the S shore of Pinnacle Island. **Gull Rock**, 93 feet high, is 0.5 mile WNW of the S end of Pinnacle Island.

Tides and currents

(445) The diurnal range of the tide at St. Matthew Island is 2.1 feet. (See the Tidal Current Tables for predictions at St. Matthew Island.)

(446) In 1971, a rock covered 23 feet was reported 127 miles SW of St. Matthew Island in 58°38.0'N., 175°02.5'W.

(447) **St. Lawrence Island** is in the N part of the Bering Sea about 120 miles S of Bering Strait.

(448) The E end of this island is usually made by vessels bound into Norton Sound, and in clear weather can be seen from a distance of 30 to 35 miles. From Southeast Cape a ridge of mountains extends in a N direction across the island, and another ridge extends in a N direction from Apavawook Cape to Northeast Cape. Between these two ridges a deep bight makes in from S, and at its head very low land extends N across the island. The shore of the E end of the island is generally a low sand beach with outlying rocks; the mountain ridges begin 0.5 to 2 miles back from the beach.

(449) **Northeast Cape**, E end of St. Lawrence Island, is low tundra land, with numerous freshwater lakes. The cape is 2 miles wide to the foot of a mountain that rises abruptly and has a peak 1,435 feet high. This peak can be seen on a clear day for 35 miles or more. At 0.3 and 0.6 mile from the end of the cape are two hummocks 94 and 280 feet high, respectively; the lower hummock is in 63°18'N., 168°42'W.

(450) Although the bottom is irregular off the point of the cape, no breakers were noticed while passing it in rough weather. The N shore of St. Lawrence Island, for 10 miles W of Northeast Cape, is a low sand beach and grassy tundra with numerous freshwater lakes. Anchorage with shelter from S or SE winds can be had along this shore about 2 miles from the beach in 8 to 9 fathoms; the holding ground is not good, the bottom being gravel. At a point on the N shore 6 miles W of Northeast Cape, breakers extend 1 mile offshore.

(451) From the Northeast Cape the E coast of St. Lawrence Island has a general S trend for 4 miles to a point where a 450-foot-high spur from the higher hills reaches to within 0.5 mile of the beach; along this stretch the 6-fathom curve is 0.8 to 1 mile offshore.

(452) The coast then trends SSW for another 4 miles, then curves W and N for 5 miles, forming **Apavawook Cape**, which is so rounding that it has no definite point. This entire stretch of coast is a low, narrow strip behind which is a large lagoon. The mountains are about 2 miles inland and about 900 feet high.

(453) **Punuk Islands**, 4 to 5 miles SSE from Apavawook Cape, are a group of three small islands 1.5 miles long; the NE end of the group is about 13.2 miles 192° from Northeast Cape. The northernmost and largest island has two marked rocky hummocks, the higher being 230 feet high; on the SW end of the island are the remains of a native village. The southernmost island is an irregular mass of rocks, the highest point about 75 feet above water. Between these islands is a low, sandy islet, which is separated from the other two by narrow channels completely obstructed by ledges, over which the sea breaks. The shores of all the islands are foul, and a ledge extends S from the southernmost island; a rocky shoal covered 3½ fathoms is 1.4 miles S of the

southernmost island; over 7 fathoms can be carried 2 miles S of the islands. A reef covered 2 to 3 fathoms extends about 0.7 miles NNW of the southernmost island. Vessels should approach these islands with caution.

(454) A reconnaissance survey in 1951 indicated a clear approach to good anchorage in N and W weather off **Maknik Lagoon**, NW of Punuk Islands. The anchorage, in 6½ fathoms, is in 63°09'N., 169°15'W., about 1.5 miles off the beach. All soundings showed a uniform slope to the 6-fathom curve, where there is a break and a steeper slope to the beach. Maknik Lagoon is behind the low sand barrier beach.

(455) Heavy breakers have been observed in the channel between Punuk Islands and Apavawook Cape; vessels should not attempt to pass through. A depth of 3 fathoms is 1.7 miles NW of the northernmost and larger island. Several areas with 3½ fathoms are in this passage. From E the islands can be approached as close as 1 mile. It is reported that 2.8 miles **220°** from Punuk Islands the flood current was observed setting about 024° with a maximum velocity of 1.1 knots.

(456) **Southeast Cape** is about 5 miles across on its S face; the E point of the cape slopes gradually to the water for 0.3 mile from the highland, and a reef extends about 0.5 mile SE from the point. The W point is lower and slopes more gradually to the water for 3 miles from the highland, and a reef makes off from the point in a S direction for 2 to 3 miles. The bight between these points is very foul and should be avoided.

(457) **Kialegak Point**, about 5 miles NNE of Southeast Cape, is a long sandspit strewn with rocks that extends in an E direction from the highland of the coast. There are breakers about 0.8 mile **355°** from the end of the cape, and there may be others inside; a reef extends S from the S side of the sandspit for about 1 mile. The remains of a native village are on the sandspit.

(458) The bight between Cape Kialegak and Apavawook Cape has a uniform slope from 16 fathoms to the 10-fathom curve, where there is a steeper slope to the beach. The 10-fathom curve is about 2 miles off and parallels the shoreline. Good holding ground can be found in most parts of the bight with good anchorage in N and W weather. Within 3 miles of the Punuk Islands the holding ground is very poor and is not recommended.

(459) **Northwest Cape**, the NW end of St. Lawrence Island, 660 feet high, is a steep, black bluff and flat on top. A wide sand beach is W of the bluff. **Gambell** is a native village with a school and a store, open the year round. Small quantities of oil and gasoline are available. A visiting nurse calls at the village periodically. A small airstrip is available. Mail and supplies are flown in weekly from Nome. Radiotelegraph communication is maintained.

(460) The water is deep close to Northwest Cape, and anchorage can be had in 9 fathoms, rocky bottom, 0.5 mile offshore on either side of the point of the sand beach with Gambell village bearing **225°**. In W winds, breakers have been observed that extend 400 yards NW from the NW tip of land about 1.7 miles W of Northwest Cape. The bay, 6 miles SE of Northwest Cape, affords anchorage with protection from S and W winds, in 9 fathoms, rocky bottom, off the house on the beach.

(461) The W end of the island, S of Northwest Cape, is rolling land. From **Tatik Point** around to the bay E of **Southwest Cape**, the land is mountainous and abrupt close to the coast, being highest at Southwest Cape. Only a few families live at Southwest Cape.

(462) Several rock pinnacles, the largest of which is 25 feet high, are off the SW tangent of Southwest Cape on the E side of the entrance to Murphy Bay.

(463) Between the highland E of Southwest Cape and **Siknik Cape** the land is low. A vessel reported striking a submerged rock about 2 miles offshore at a point about 16 miles NE of Southwest Cape.

(464) A reef, bare at low water, makes off 1 mile in a 220° direction from Siknik Cape. The submerged part of this reef extends about 4 miles in a general **175°** direction from the bare part. This reef is dangerous, as the water shoals abruptly when approaching the cape.

(465) The rest of the island is generally high and rolling. There are some submerged rocks in the bight W of Southeast Cape, and also some detached rocks showing off the N shore near **Kookoolik Point** and **Savoonga Point**. It is probable that with care an anchorage may be found almost anywhere around the island, but the shores must be approached with caution.

(466) **Savoonga**, at the extreme end of Savoonga Point, has a school and a native store open the year round. Small quantities of gasoline, diesel fuel, and motor oil are available. Mail is delivered from Gambell weekly, weather permitting, by boat in summer or dogsled in winter. There is a village nurse. An aerolight is shown at Savoonga. Radiotelegraph communication is maintained.

(467) A bar that extends NE from the village breaks at low water. Anchor just W of the village in 6 fathoms. Good anchorage can also be found about 1 mile W and 1 mile N of the village in 14 fathoms.

Tides and currents

(468) The diurnal range of the tide at St. Lawrence Island varies from 1.2 feet at **Niyrakpak Lagoon** entrance, 26 miles W of Savoonga, to 2.4 feet at Northeast Cape and **Powooiliak Point**, 6 miles NE of Southwest Cape.

(469) The current velocity about 0.8 mile off Savoonga is about 1 knot on the flood setting NW and 1.5 knots on the ebb setting E. The current velocity at other places

around St. Lawrence Island is generally less than 1 knot. (See Tidal Current Tables for predictions.)

Weather, Savoonga Vicinity

(470) During the ice-free months of May to November, the diurnal temperature range is only 5° to 10°F (3° to 6°C). From January through March, the range is 10° to 12°F (6° to 7°C). In the winter, passing cyclonic storms exert the major control on air temperatures. Mean monthly temperatures at Gambell range from 2.8°F (-16.2°C) in January to 49.3°F (9.6°C) in August. Extremes of -28°F (-33.3°C) have been recorded in March and 71°F (21.7°C) in July.

(471) Relative humidity at Gambell is high, usually 80 to 90 percent or more. At least a trace of precipitation occurs on 275 to 300 days a year, yet the annual total is only about 15 inches (381 mm), about half of which falls during July to October, the ice-free months. The greatest rainfall comes with SE winds of cyclonic centers to the S of the island. Snow accumulation is at a maximum of about 2 to 2½ feet (0.6 to 0.8 m) in March, and by the first week in June it remains only in drifts, some of which persist through the summer.

(472) During the winter, from October through April, the wind is prevailingly from the N or NE and averages over 17 knots. The peak recorded velocity was 69 knots in October 1947 and was from the N. During the summer, the wind is more variable, being from the N or NW about 30 percent of the time and from the SE or SW about 40 percent of the time. The mean summer velocity is 10 to 11 knots; the mean maximum is 33 to 35 knots.

(473) Throughout most of the year, and particularly in the summer from May to September, broken to overcast sky conditions prevail. Clear skies are seldom seen more than 2 or 3 days a month. The principal cloud types consist of fog, stratiform, and rarely cumuliform clouds at various levels. Most are generally below 10,000 feet (3050 m). Low ceilings are most common during the summer. The visibility is over 7 miles (13 km) for about 70 percent of the period June through September. The best visibility is in September.

(474) Navigation is difficult from mid-December to late May and is suspended during most of March and April.

(475) **Warning**.–The soil, surface waters, and vegetation of St. Lawrence Island are potentially contaminated by the microscopic eggs of a parasite that causes a long-term and sometimes fatal infection of the liver known as alveolar hydatid disease. Although this parasite occurs elsewhere on the W and N coasts of Alaska, it is unusually common on this island, where it is carried by local dogs, cats, and wild foxes. Visitors are warned to avoid contact with these animals and not to transport them under any circumstances from the island to other localities.

Communications

(476) Air service is available to Savoonga and Gambell from Nome. An aerolight is shown from the Gambell airport 0.5 mile S of the town.

(477) Ships visit St. Lawrence Island infrequently. A Northland Marine Lines barge calls at Savoonga and Gambell once a year. An Alaska Native Service vessel makes a trip or two each year, and one or two visits by Coast Guard cutters can be expected. Local vessels from Nome call occasionally.

(478) Transportation about the island in summer is mostly by native walrus hide boats or whaleboats, which usually are powered by outboard motors mounted inboard in a specially constructed well. Dogsleds are used in winter and summer on tundra, but are not particularly efficient in summer. There are no roads. Trails are unmarked, but are readily followed in the areas around Gambell and Savoonga.

(479) Caterpillar tractors are available at Gambell and Savoonga, but their use for ordinary transportation is prohibitively expensive. Trains of tractors and go-devils can be used in many parts of the island if heavy transportation is necessary. Weasels have proved their value on snow, on the tundra, and in small lakes; such vehicles can move over most of the island, except on the coarsest boulder fields and the steeper slopes.

(480) Landings can be made on almost any part of St. Lawrence Island during the summer. The surf is not heavy, except where brisk offshore winds pile up the shallow offshore water into large breakers. Supplies for Gambell are landed by whaleboat on both the N and W sides of the spit, depending upon weather and sea conditions. At Savoonga, supplies can only be landed during periods when a N wind is not blowing because of the heavy surf.

Chart 16006

(481) **Cape Vancouver** (60°32.0'N., 165°24.0'W.), about 16 miles NE from Nunivak Island, is a bold promontory, 1,132 feet high. The shoal from the mouth of the Kuskokwim River is thought to extend along the coast to Cape Vancouver, so that on the S side of the cape the water is shoal; about 6 miles W of the cape a 1.5-mile circular shoal covered 1½ fathoms was reported in 1957. Immediately off the end of the cape is deep water that extends about 5 miles along the N side of the bight on which the native village of **Tununak (Tanunak)** is situated. This bight is a series of mudflats mostly bare at low water. The BEAR anchored in 4½ fathoms about

1 mile off the S point of the bight and reported shoals that extend NW off the mouth of that bight. **Hazen Bay** is also reported to be shallow.

(482) **Hooper Bay**, 60 miles N of Cape Vancouver, and the second bay S of Cape Romanzof, appears to offer the best anchorage for moderate-draft vessels in the area between Cape Vancouver and Cape Romanzof. The recommended anchorage is 0.2 mile SE of the E end of the sandspit, about 2.5 miles SE of the village of Hooper Bay. The least depth found in the approach to the anchorage was 3½ fathoms on the series of sand ridges that parallel the beach. The anchorage is in 8 fathoms in the channel between the sandspit and a sandbar to the E that bares at low water.

(483) Off the end of the sandspit, the channel is about 0.3 mile wide and its axis is in a NE-SW direction. Both sides of the channel are very steep, and depths of as much as 13 fathoms were found close to the spit.

Currents

(484) (See the Tidal Current Tables for predictions for Kokechik Bay.) There are two floods and two ebbs each day; the flood sets NE and the ebb SW.

(485) The village of **Hooper Bay**, 62 miles NNW of Cape Vancouver and 17 miles S of Cape Romanzof, is the most prominent feature in the area. It is on the highest ground, and the school and tin-roofed buildings are visible for about 10 miles. To reach the anchorage, steer **075°** for the village until within 2.5 miles of shore, then steer **130°** until abeam of the E end of the sand dunes and within 1.1 miles of shore, then head for the anchorage off the sandspit.

(486) The village can be reached from the anchorage by small boat across the W end of the bay and up the creek along which the village is situated. The entrance to the creek is marked by stakes which should be left to starboard when entering. The limiting depth depends on the stage of tide but in 1994 depths of 2 to 4 feet were reported at low water in the channel. The entrance to the creek bares at low water, and the entire W end of the bay is very shallow, but there is deeper water inside the creek. There are no docks or piers for mooring; most boats either make fast to the shore or beach themselves. Services include telephone, mail, stores, and a health clinic. There are daily flights to Bethel from a nearby airfield; radiotelephone communications is maintained.

(487) Small boats drawing 1 to 4 feet, depending on the season of the year, can travel inland from Hooper Bay to the Yukon River. The route follows the **Keoklivik River**, S and larger of the two emptying into Hooper Bay, to a junction with the **Kashunuk River** at the old village of **Chevak;** thence through a cutoff ending at the junction of the **Aphrewn River** and the Kashunuk River; thence up the Kashunuk River into Driftwood Slough about 5 miles S of the Yukon.

(488) Entering Keoklivik River can only be done by small boat. In 1994, the USCGC IRONWOOD reported that the river forms a delta at the mouth and a small channel leads through numerous sand bars, shoals, and mud flats into the river. The transit should be made at low water to find the channel through the flats. Chevak village reportedly marks the channel with a buoy and stakes, but local knowledge is still required. Once inside the river, depths of 5 to 25 feet were reported to Chevak. The village can be contacted via VHF-FM channel 73 by using the voice call "Corporation". There are no piers or docks at Chevak, so small boats tie off to the shore or beach themselves. Telephone, mail, store, and a Village Public Safety Officer are available. There are daily flights from Chevak to Bethel.

(489) **Driftwood Slough** has two entrances from the Yukon. The one most used is about 2 miles downriver from **Pilot Station**, which is about 115 miles above the mouth of Apoon Pass. The other entrance is about 12 miles above **Mountain Village**, which in turn is about 85 miles above Apoon Pass. The part of the slough leading from this latter entrance meanders considerably and is little used. At the Yukon, Driftwood Slough is about 250 feet wide and is 1½ to 2 feet deep during the dry season.

(490) Following the ice breakup in the spring, the least depth along the inland route is about 3 feet; by early July it is about 1 to 1½ feet; and by early September, after the rainy season in August, it may be as much as 4 feet. The shallowest part of the passage is about 20 miles SSW of Pilot Station.

(491) This inland passage may also be entered from the Bering Sea by way of the Kashunuk River, which empties into the sea between Hooper Bay and Hazen Bay, or from Hazen Bay by way of the Aphrewn River.

(492) **Kokechik Bay** (also see chart 16240) is the funnel-shaped body of water on the S side of Cape Romanzof. The neck of the funnel is at the E end of the bay and is the mouth of the **Kokechik River**. On the seaward side of the bay a long narrow sandspit extends N from **Dall Point** for about 6 miles. On the spit is a ridge of low dunes that are visible about 5 miles to seaward on a clear day.

(493) About 0.8 mile N of the spit, a long narrow sand and mudflat, part of which bares at all stages of the tide, begins and extends to within 0.5 mile of Cape Romanzof. The gap between the spit and the flat is the best entrance to Kokechik Bay. Except for the deep water that extends 1 mile inside the entrance, the bay consists mostly of extensive flats 4 to 5 feet deep with numerous bars that bare at low water.

(494) About 1 mile off the entrance to Kokechik Bay is an extensive breaking shoal that bars approach from the NNW and W. The best approach to the bay is on an ENE course for Dall Point, which shows very well and is easily identified by radar in thick weather. From off Dall Point, steer a N course, paralleling the sandspit and about 0.8 mile off, and round the end of the spit at a distance of about 0.5 mile. The controlling depth along this course to the end of deep water 1 mile inside the entrance is 12 feet.

(495) Large vessels must anchor at least 5 miles W of the sandspit in 5 fathoms, sand bottom. Vessels up to 12-foot draft will find protected anchorage in the 10-fathom holes, one outside and the other inside the entrance to the bay. The outer anchorage, 0.8 mile NW of the end of the sandspit, is between the previously described shoal and the spit, and has mud bottom. The inner anchorage is 0.8 mile NE of the spit and has sand and mud bottom.

Tide and currents

(496) The diurnal range of **tide** is 6.5 feet in Kokechik Bay. Tidal **currents** are estimated to have a velocity at strength of 1.5 to 2 knots in the entrance.

Charts 16006, 16240

(497) **Cape Romanzof** (61°48.0'N., 166°06.0'W.), 85 miles N of Nunivak Island, is a bold and prominent headland with cliffs rising abruptly from the water over 1,200 feet along its W face; at the sharp extremity of the cape are remarkable perpendicular shafts of rocks on the side of the cliff. The cape is the W termination of the **Askinuk Mountains**; the highest 2,363 feet is about 5 miles from the cape, and can be seen a considerable distance at sea. An aero radiobeacon is on the cape.

Tide

(498) The diurnal range of tide at Cape Romanzof is 6.8 feet.

Current

(499) Past observations showed a diurnal tidal current velocity of nearly 0.5 knot about 7 miles SW of Cape Romanzof.

(500) Wind effects are important at this location. Continued strong S winds will cause the current to set N continuously for days at a time, and a similar S current results from N winds. The greatest velocities during nearly a month of hourly surface observations were 2.2 knots N and 2 knots S; in each case the current was setting approximately with a wind of about 40 knots.

(501) The S end of **Sand Islands** is 4.5 miles NE of Cape Romanzof. These two islands, **Neragon Island** and **Krekatok Island**, extend in a general N and S direction about 13 miles, including the interval between them. The N island is mostly covered at high water.

(502) The coast trends in an E direction from Cape Romanzof 15 miles to the mouth of **Kun River**, and throughout most of this distance is bordered by abrupt cliffs and hills gradually diminishing in elevation.

(503) **Scammon Bay**, entered between Cape Romanzof and Neragon Island, is very shoal with numerous bars bare at low water. There are two small coves along its S side, **Windy Cove** and **Edmonds Cove**, respectively 1 and 9 miles from Cape Romanzof, but both are quite shoal. **Kongishluk Bay** is the native name for Edmonds Cove. A limited area with depths of 5 fathoms is just S and E of the S end of Neragon Island, and a channel of the same depth leads into it and passes about 2.2. miles N of Cape Romanzof. A narrow channel with a minimum depth of about 1½ fathoms continues through Scammon Bay and into the Kun River. The depths are from 2 to 4 fathoms off Cape Romanzof, but the water shoals quickly NE, so there is little protection except for very light draft boats. A large shoal area with breakers is about halfway between the cape and Neragon Island, and another shoal with less than 2 fathoms is 2.5 miles 338° from the cape. Along the highland forming the S shore of Scammon Bay the water is 1 fathom or less in depth throughout its length, except just inside Cape Romanzof.

(504) The village of **Scammon Bay** is on the S shore at the entrance of Kun River. Radiotelegraph communication is maintained.

(505) The coast is low and marshy from Kun River N to the Yukon Delta. The waters along this stretch are extremely shallow and are navigated only by river boats.

(506) **Black River**, 39 miles NE of Cape Romanzof, is marked by **Black River Entrance Light** (62°21'20"N., 165°20'50"W.), 20 feet (6.1 m) above the water and shown seasonally from a skeleton tower with a red and white diamond-shaped daymark on the E side of the entrance.

Chart 16006

(507) **Norton Sound** is one of the important arms of the Bering Sea. Some supplies for Yukon River by way of St. Michael pass through it. The N shore is important because of the mining operations there. The S side of the entrance to the sound is occupied by the extensive Yukon Flats and should be avoided by deep-draft vessels. The rest of the sound generally has soundings of 8 to 12 fathoms; the greater depths are near the N side. Off

Cape Nome and Cape Darby are spots with depths of 15 to 19 fathoms. The bottom of the sound is very even, and the depths decrease to the shore with marked regularity. There is driftwood on all the shores of the sound.

Weather, Norton Sound Vicinity

(508) During the season of navigation the prevailing winds are S with variable force. Severe storms are usually from the SW. June, with less severe winds, appears to be the best month for navigation. July is about the same, but the rainy season and SW winds pick up in the latter part of the month and continue through August and part of September. September is usually somewhat drier, with more frequent winds from the N. Prevailing winds during October are N to NW; the general weather is clearer and colder.

Fog

(509) The remarks on fog in the Bering Sea apply to the region W of Cape Nome, but not to Norton Sound E of it. On entering the sound with thick weather in the Bering Sea, a vessel will find that the fog almost always thins out and gradually clears as the vessel proceeds up the sound. At St. Michael fogs are rare except in the spring when ice floes are close in to Norton Sound and the winds are W. With E winds the area is clear of fog.

Mirage

(510) In the vicinity of St. Michael and Stuart Islands and the coast S, mirage often distorts the appearance of the land and sometimes greatly magnifies small objects.

(511) Because of this abnormal refraction, positions obtained by astronomic sights (especially on the flats) cannot be depended on and may be several miles in error although the sight seemed good.

Charts 16006, 16240

(512) The **Yukon Delta** extends about 90 miles from Black River, 40 miles NE by N from Cape Romanzof, to Apoon Pass. The land along the coast is only a foot or two above high water, is covered with low marsh grass, and is entirely lost to view when but a few miles offshore. The only landmarks visible in clear weather are the sharp peaks of **Kusilvak Mountains** and the Askinuk Mountains back of Cape Romanzof, all very distant and often obscured by clouds or mist. The extreme flatness of the land and the remarkable mirage effect, often seen over the shoals when bare, make the whole region deceptive at times.

(513) The river discharges by many mouths through the delta. The bars at the entrances have little depth, and the channels through the flats are narrow, crooked, and bordered by shoals bare at low water. They are also subject to constant change. Apoon Pass is the entrance used by the river boats.

(514) When well inside the confined bank the country on each side is covered with an almost continuous growth of willow and alder bushes. The water has a brownish white appearance, something like glacial water, without its fine, sharp grit. It has no unpleasant taste and is always fresh in the inner channels.

(515) The main channels are free from snags, though trees sometimes become temporarily lodged on the bars and quantities of driftwood are piled along the shores in places. Undoubtedly the ice carries off the snags when it goes out each season. The channels and banks show indications of changing rapidly both from erosion and deposits. Very probably much of this is effected each year during the breaking up of the ice, its consequent jams, and the great floods following.

(516) The 3-fathom curve is about 6 miles off Cape Romanzof and about 18 miles off the Yukon Delta and the shore of Pastol Bay, then comes close in to the shore of Stuart Island. From the cape to the delta, detached shoals with depths of 2¾ to 6 fathoms are as much as 30 miles from shore. Deep-draft vessels should avoid depths less than 8 fathoms.

(517) There are several settlements along the passes of the Yukon Delta. Strangers are advised to seek local knowledge before entering the Yukon Delta passes. Local independent pilots from Alakanuk and other settlements upriver monitor VHF-FM channel 16; telephone (907) 238-3629.

(518) **Yukon Delta National Wildlife Refuge** extends from Kuskokwim Bay N to St. Michael Island and includes Nunivak Island. The refuge is a Marine Managed Area. (See **MMA 8-2**, Appendix C, for additional information.)

Currents

(519) Currents varying from 0.5 to 1.5 knots have been observed in the delta channels. Greater velocities occur in the bar channels and up the river; none observed exceeded 3 knots.

(520) The prevailing **winds** in summer are NE, E, and SE. The strong blows are from the same directions, the most severe being the strong E winds that funnel from the Yukon Valley down low Unalakleet River Valley. In winter, 50-knot winds are common. The area has considerable mist and rain.

(521) **Kwemeluk Pass**, 54 miles NE of Cape Romanzof, is the most S of the Yukon Delta passes. A seasonal light marks the entrance to Kwemeluk Pass on the N. **Sheldon Point Light** (62°32'23"N., 165°01'12"W.), 18 feet (5.5 m) above the water, is shown seasonally from a

skeleton tower with a red and white diamond-shaped daymark and marks the entrance to the pass on the S side. The village of **Sheldon Point** is on the S side 5 miles above the mouth; river barges call here at irregular intervals during the summer.

(522) **Kwikluak Pass**, which empties into the Bering Sea along the N side of the islands that separate it from Kwemeluk Pass, is the main S mouth of the Yukon River. **Yukon River South Entrance Light** (62°35'22"N., 164°57'42"W.), 20 feet (6.1 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark and marks the entrance to the pass. Approaches to Kwikluak Pass are generally very shallow. Accurate soundings are not available due to the shifting shoals near the entrance. The approach recommended by the river pilot is **Acharon Channel**, however, local knowledge is required to make the transit safely. Once through the river mouth, passage upriver should only be made with a pilot or with local knowledge. According to the local pilot, the limiting draft of the S entrance at high water is 15 feet. Pilotage for the S entrance can be obtained by radiotelephone on VHF-FM channel 68; call sign, WTH-5951 or arrangements can be made by calling "City of Emmonak" on channel 68. A seafood company which owns a processing plant upriver sets a series of seasonal orange buoys marking the channel, however these buoys are subject to change and are not reliable as navigational aids.

Tide

(523) The diurnal range of tide is 2.3 feet at the mouth of the pass.

(524) The villages of **Alakanuk** and **Kwiguk** on the NW bank 12 and 18 miles, respectively, above the mouth of Kwikluak Pass, have telephone communications and daily air transportation to Anchorage. Diesel fuel is available at the village of Kwiguk. Alakanuk has radio service. The village of **Akulurak** is on the SE bank 17 miles above the mouth.

(525) **Kwiguk Pass**, about 12.5 miles N of Kwikluak Pass, connects Bering Sea with Kwikluak Pass at the village of Kwiguk. A seasonal light marks the seaward entrance to the pass. **Emmonak**, is a native village about 10 miles inside the entrance. There are no piers or docks at the village, skiffs or boats are either anchored, beached, or moored to shore. Using local knowledge, Emmonak can also be accessed from Kwikluak Pass. Pilotage can be obtained by radiotelephone, by calling Emmonak on VHF-FM channel 68; call sign, WTH-5951. Emmonak has fuel, water, mail, telephone, and airline services.

(526) **Kawanak Pass** and **Kwikpak Pass** have a common outlet to the sea about 30 miles N of Kwikluak Pass. A seasonal light marks the entrance to Kawanak and Kwikpak Passes. The diurnal range of tide is 2.7 feet inside the mouth of Kawanak Pass.

(527) **Head of Passes** on Yukon River is the junction of Kwikluak and Kwikpak Passes at 62°30'N., 163°51'W.; the junction is 42 miles from the mouth of Kwikluak Pass and 53 miles from the mouth of Kwikpak Pass. Kawanak Pass and Apoon Pass join Kwikpak Pass 26 and 22 miles, respectively, above its mouth. By way of Kwikpak Pass, Head of Passes is 49 miles from the mouth of Kawanak Pass and 55 miles from the mouth of Apoon Pass. A seasonal light marks the junction of Kwikluak and Kwikpak Passes.

(528) **Pastol Bay**, at the NE extremity of the Yukon Delta is about 25 miles wide between the delta on the W and Point Romanof on the E and has general depths of 1 to 6 feet.

(529) **Apoon Pass**, at the head of Pastol Bay, is the principal approach to Yukon River from St. Michael. In common with the rest of this region, the surrounding country is only 1 to 2 feet above high water. The banks of Apoon Pass, to within about 2 miles of its mouth, are mostly covered with willow and alder bushes 8 to 10 feet high. At the mouth the land is more marshy, and a large area to the W appears to be entirely an open marsh. The channels and banks of the pass are subject to rapid changes from erosion and deposit.

(530) The open country E of Apoon Pass is mostly marsh, ponds, and tundra. The only high ground is **Hogback Hill**, a rounded ridge about 300 feet high, 7 miles E of the pass and 2 miles back of the coast. A range of hills and mountains 10 to 20 miles back of the coast extends SW to the first great bend in the Yukon.

(531) The approach to Apoon Pass is across unmarked shallow flats. The entrance to the pass is marked by a seasonal light. Because the depths are only 1 to 2 feet, all but the shallowest draft vessels must cross the flats at or near high water.

Tide and current

(532) The **tide** in Apoon Pass is more or less diurnal; the diurnal range is 4 feet at the mouth of the pass and about 1 foot at the Head of Passes. The tides at the entrance are greatly affected by winds, that may be strong enough to entirely obliterate the natural tides; N and E winds lower the water level, and S and SW winds raise it. The ordinary outflowing **current** in Apoon Pass is much less rapid than that in other passes, but there is a tidal inflow and outflow with velocities that depend upon the particular range of the tide.

(533) **Chaniliut**, on the S side 1 mile above the mouth of Apoon Pass, has a school and radiotelephone service. **Kotlik** is at the mouth of **Kotlik River**, which empties into the S side of the pass 5 miles above the mouth.

(534) A seasonal light marks the junction of Apoon Pass and **Okwega Pass** 8 miles above the mouth.

(535) **Old Fort Hamilton** is on the SE side about 22 miles above the mouth of Apoon Pass. The abandoned village of **Hamilton** is near Old Fort Hamilton.

(536) **Nunachik Pass** and **Little Apoon Pass** make off to the W from Apoon Pass just above Old Fort Hamilton. Apoon Pass joins Kwikpak Pass 25 miles above the Apoon mouth. **New Fort Hamilton**, on the E bank of Kwikpak Pass, is 40 miles from the Apoon mouth.

(537) **Yukon River**, one of the largest of the world, is the largest and most important river in Alaska. It is navigable for flat-bottom boats along its entire course from the mouth to near the head of **Lake Bennett**. No one company operates vessels along the entire river. Transfer points are at **Marshall**, 153 miles above Apoon Pass; **Tanana**, 628 miles above Apoon Pass; **Nenana**, 50 miles SW of Fairbanks on the Tanana River; and **Dawson**, Canada, 1,197 miles above Apoon Pass. The **Porcupine River**, **Chandalar River**, **Tanana River**, **Koyukuk River**, and **Innoko River** are the principal tributaries of the Yukon in Alaska.

(538) Between Tanana and the delta, **Ruby**, 526 miles above Apoon Pass, is the only town on the S side of the river.

(539) River steamers may ascend to Whitehorse, Yukon Territory, Canada. The White Pass and Yukon Railway connects Skagway, Alaska, and Whitehorse, Canada, the head of riverboat navigation. The Alaska Railroad connects Seward and Fairbanks; the latter is on Chena River. **Chena River** flows into the Tanana River.

(540) Although the Yukon River is navigable all the way from the Bering Sea to Whitehorse, it can neither be entered by oceangoing ships nor navigated by them. The river itself is shallow in many places and, like the Mississippi, is a maze of bars, bayous, and side channels for much of the length. At the river mouth is a vast delta with sand flats reaching far out to sea. Such channels as the currents have made are too shallow for the passage of oceangoing ships and are perpetually shifting. The riverboats are built especially for this shallow-water work, as are those used on the Mississippi.

(541) The mouth of **Pastolik River**, about 2 miles from the outer end of Apoon Pass, affords anchorage for small vessels. The Apoon flats extend in front of the entrance, and it can only be entered at high tide.

(542) With the exception of the promontory of Point Romanof, the immediate coast is low and flat all the way from Apoon entrance to St. Michael Island. **Point Romanof**, 360 feet high, stands well out about 12 miles W from the high hills of the coast range. It appears in clear weather like an island in the sea. **Point Romanof Light** (63°12'00"N., 162°50'00"W.), 25 feet (7.6 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark.

(543) After passing Point Romanof, **Crater Mountain**, on the mainland back of St. Michael Island, and St. Michael, Stephens, and Stuart Mountains, on St. Michael and Stuart Islands, appear above the horizon and are excellent landmarks.

Anchorage

(544) An anchorage for medium-sized vessels is in the mouth of the right-hand stream of **Pikmiktalik River**, 8 miles NE of Point Romanof. The depth over the bar is about 2½ feet. A shoal extends out from the S point at the entrance.

(545) In moderate weather the ocean swell is not felt between the Apoon entrance and Stephens Pass; but in heavy weather and W weather, which is more likely to occur during the latter part of the season, a choppy sea develops and is heavier off Point Romanof than elsewhere. In general, this passage is safe for river steamers in the summer season. During the latter part of the season, however, high winds become more frequent, and the boats are obliged to watch their opportunities.

Anchorages

(546) Riverboats anchor on the flats or in the channel, wherever exigency demands. In the S end of St. Michael Canal in the S branch just above the junction, is a good and safe anchorage in all kinds of weather. The depth is only about 3 feet on the outside bar, and it has to be crossed at high water.

(547) Good protection is available from all but SW weather in 6 to 9 feet in the cove on the S side of Cape Stephens. **Stebbins**, on the shore of the cove, has a school and a nurse. Radiotelegraph service is maintained. Mail is delivered from St. Michael and Unalakleet.

(548) **Stuart Island**, NW of St. Michael Island, is separated from the latter by **Stephens Pass**, which has a minimum width of about 0.6 mile. The island is divided into two approximately equal parts by a narrow N-S waterway which is used considerably by small launches and native craft. **Stuart Mountain**, 480 feet high, E of the center, is the highest point. The rest of the island is low and rolling, with some small, scattered peaks. The shore of the island is very irregular. From **North Point** to **Observation Point** and around through Stephens Pass is a line of conspicuous bluffs about 170 feet high; the rest of the coast is much lower. From Observation

Point to the W point of the island the N shore is free from outlying dangers; 5 fathoms can be carried 1 mile from the beach. Off the W point, some detached rocks extend about 300 yards. On the E face of the island, well toward the SE point, a shoal makes out about 3 miles. **Cape Stephens Light** (63°32'27"N., 162°18'49"W.), 200 feet (61.0 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark on the SE side of Stephens Pass.

(549) **Egg Island**, 16 miles E of Stuart Island, is small and affords little protection in heavy weather, but it is the only lee to be had in N gales. The water off the W shore is deep, 6 fathoms being found close inshore. **Egg Island Light** (63°36'40"N., 161°44'35"W.), 90 feet (27.4 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark on the highest part of the island.

(550) **St. Michael Island**, separated from the mainland by St. Michael Canal, is mostly low, but has two conspicuous rises: **St. Michael Mountain**, 450 feet high, near the center of the island, and sharp conical **Stephens Hill**, 331 feet high, overlooking Cape Stephens and Stephens Pass.

(551) **St. Michael Canal** is a narrow, crooked tidal slough that forks and comes together again. Distances through the canal are 18 miles by way of the N fork and 20 miles by way of the S fork. The S fork is generally used because it is wider. Depths in the canal are probably less than the 6 feet of the old improvement project, but are sufficient for the traffic of the area; the depth over the bar at the SW entrance is about 3 feet. **Canal Point** is on the N side of the SW entrance.

Chart 16240

(552) **St. Michael Bay** is the harbor on the E side of St. Michael Island. **Orizaba Reef** extends 1.5 miles off **Rock Point,** and is **051°** from St. Michael Mountain.

(553) **Whale Island**, close off the E end of St. Michael Island, is 95 feet high and small; on approaching the harbor its E end is seen as a vertical bluff. **Whale Island Light** (63°29'27"N., 161°59'50"W.), 53 feet (16.2 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark on the E end of the island. Four tanks are about 0.75 mile NE of the village of St. Michael. The passage between Whale and St. Michael Islands is blocked by rocks, bare at low water. E and N of the island the water deepens rapidly.

(554) A boulder covered 18 feet is 0.5 mile 064° from Whale Island Light.

(555) **Beulah Island**, about 0.3 mile NNW from Whale Island, is 50 feet high, small, and rounded. It has bold water off its NE side. Between this and Whale Island the water is shoal.

(556) **Saint Michael**, near the E end of St. Michael Island, is about 55 miles from Apoon Pass via Stephens Pass. The village shows little evidence of the days when it was of major importance in the Yukon River traffic. Gone are most of the buildings of the Army post and the warehouses of the trading companies, and the tall masts of the telegraph company; the waterfront is littered with the rotting hulks of the once great river fleet.

(557) The Northern Commercial Co. operates the only remaining trading post at Saint Michael and maintains facilities for transfer of freight from ocean to river vessels. The village has a church, school, and health clinic.

(558) Limited amounts of diesel fuel and supplies can be obtained at the trading post. Yutana Barge Lines reportedly has a fuel terminal at Saint Michael and uses two sunken barges as makeshift docks. Gasoline and lodging are also available in Saint Michael. A marine railway operated by Yutana Barge Lines can handle vessels to 100 tons and 9 feet in draft with limited machine shop facilities.

(559) Telephone and radiotelephone services are maintained. The village and Yutana Barge Lines can be contacted on VHF-FM channel 10 by calling "79 Yutana". Mail and daily flights to Nome and Unalakleet are available. Yutana Barge Lines runs boats in the summer on an irregular schedule from Saint Michael to Nenana, on the Yukon River.

Anchorage

(560) The harbor and anchorage for seagoing vessels is an open roadstead exposed to winds from NW through N to E. Larger vessels anchor in the offing between St. Michael Bay and Egg Island, and in heavy N gales shift their anchorage to get a lee under Egg Island or go to sea. Anchorage is found about 0.5 mile SE of Whale Island in 3½ to 4 fathoms, bottom dark-blue mud, and good holding ground. Care should be taken to avoid the 18-foot boulder.

(561) Good anchorage in 5 fathoms is 3 miles off Whale Island Light on the following bearings: Egg Island **038°**, Crater Mountain **205°**, Whale Island Light **227°**, North Point of Stuart Island **294°**. Use 45 fathoms of chain.

(562) Light-draft vessels and river steamers can find shelter from N and W winds by anchoring near the E side of the island, in 3 to 8 feet. The shores of St. Michael Bay are strewn with loose rocks that are often frozen in the ice in winter and dropped as it goes out in the spring. Light-draft vessels, when anchoring in shoal water, should be careful not to anchor over any of these loose, scattered rocks.

Tides

(563) The tides of Saint Michael are chiefly diurnal, the range being 3.9 feet. (See the Tide Tables for daily predictions.)

Currents

(564) About 0.8 mile offshore in St. Michael Bay, the current velocity is about 0.8 knot. Like the tide itself, the tidal current is chiefly diurnal and sets SE on the flood and N on the ebb.

(565) Saint Michael being the end of deepwater navigation, all the Yukon traffic beyond this point has to be conducted with vessels drawing 5 feet or less. The larger launches leaving St. Michael Bay go around the N side of St. Michael Island and through Stephens Pass, between St. Michael and Stuart Islands. They give a wide berth to the reef off Rock Point, on the N side of St. Michael Island, and, after passing between the islands, make a straight course slightly W of Point Romanof. When the summit of Point Romanof is abeam, about 1.5 miles, the direction is changed and a course is steered for Apoon Pass. The most dangerous part of the passage is the 14 miles around the N end of St. Michael Island, which is exposed to the deepwater swell from the N. This can be avoided by small craft by going through St. Michael Canal

Routes

(566) **Routes for small craft between Isanotski Strait (False Pass)** (55°05'N., 163°30'W.) and **Saint Michael** (see charts 16006 and 16240).–After passing out of Isanotski Strait, clear of the outlying breakers, the course is shaped for the E side of Amak Island. Shelter can be found on the S, SE, and E sides of the island.

(567) Leaving Amak Island, the next course is set for Cape Newenham. Shelter can be obtained on either side, according to the wind. From Cape Newenham the course is set for Nunivak Island. If heavy N or NE winds are encountered before the island is reached, shelter is sought in the depth of the bight on the S side. Weather conditions being good, it is only necessary to touch at this island if needing water. The anchorage on the N side, about 12 miles E of Cape Etolin, is considered the best. (See Nunivak Island earlier in this chapter.)

(568) From the N end of Nunivak Island the customary course is to cross over diagonally to a little N of Hazen Bay, and then coast along just outside the shoals in 3 to 5 fathoms of water until Cape Romanzof is reached. If the weather is unfavorable or water is required, an anchorage in Scammon Bay is made close inshore on the S side, in a bight where a stream empties.

(569) After leaving Scammon Bay, by giving the spit on the N side of the entrance a good berth, the remaining distance to Saint Michael is made by skirting along on the outer part of the Yukon Flats, in 2 to 5 fathoms, where the courses are exclusively guided by sounding. On this crooked stretch, after the mountains of Cape Romanzof and the Kusilvak Mountains disappear, no land will be visible until the high peaks on the mainland S from Stuart Island are sighted; a little later the summits of Stuart and St. Michael Islands become visible. After Stuart and St. Michael Islands become defined, the course is shaped to go through the pass between them, and then skirt around the N side of St. Michael Island to Saint Michael.

(570) In the summer, N and E winds prevail a large part of the time between Cape Newenham and Cape Romanzof. The tidal currents in Etolin Strait are strong and at times cause heavy tide rips.

Chart 16200

(571) The coast from St. Michael Bay to Cape Darby is generally low and rock strewn, and the depths when approaching it shoal gradually from 6 fathoms toward the beach; a depth of 3 fathoms can be taken as close as 0.8 mile except in a few places. There are no outlying dangers, but a reef makes off about 0.5 mile from the shore 2 miles S of **Black Point**, about 26 miles E from Saint Michael. **Tolstoi Point** and its vicinity are high and rocky, and from there to Unalakleet River the shore is low.

Anchorage

(572) Anchorage with good protection from S winds can be found in **Klikitarik Bay**, 15 miles E of Saint Michael. There are several native campsites along this coast, but the only permanent settlement is Unalakleet.

(573) **Unalakleet** (63°53'N., 160°47'W.), at the E end of Norton Sound, is the largest village on the sound E of Nome. Approach to Unalakleet is generally from the NW because of shoaling that occurs E and SE of **Unalakleet River** entrance. In 1994, the USCGC IRONWOOD found good water by approaching from NW on a ESE heading until intercepting longitude 160°50.0'W., then turning E, keeping the river entrance off the bow. The river entrance is marked by seasonal buoys, however, local knowledge is required to transit safely. An aerolight is about 0.5 mile N of the entrance. The North River aero radiobeacon has been found valuable as an aid to surface navigation.

(574) **Unalakleet River South Spit Light** (63°52'04"N., 160°47'17"W.), 15 feet (4.6 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark on a sandspit S of the river entrance.

(575) Good anchorage for vessels with moderate draft, in 32 feet, sticky mud bottom, was found in 63°53.0'N., 160°56.0'W. Ranges were 3.5 miles from Unalakleet, 15.8 miles from Tolstoi Point, and 16.3 miles from Besboro Island. This position provided good holding ground but was highly exposed. There were not any sheltered anchorages in this area. Vessels have anchored in 5 fathoms with 60 fathoms of chain about 2 miles offshore. An alternate anchorage is about 6 miles N of Unalakleet.

(576) Services available in Unalakleet include telephone, radiotelephone, mail, a school, a church, fuel, Native store, Native Corporation store, haul out and garbage services. The village also has a health clinic with a Physicians Assistant. Daily jet air service to Nome and Anchorage is available.

Weather, Unalakleet Vicinity

(577) Unalakleet does not fall into any single climatic regime. The proximity of Norton Sound places it principally under a marine influence during those months (late spring, summer, and early fall) that the sound is free of ice. The summer temperatures are cool with a relatively small number of days annually with readings above 70°F (>21°C). The summer extreme of 86°F (30°C) in June reflects the fact that occasionally in summer warm dry continental conditions prevail for brief periods. In winter the extreme temperatures are those of a cold continental climate, but the average minimums for the season are in between the normal values for marine and continental climates at this latitude.

(578) Precipitation also appears to be variable between marine and continental influences. The increased amount of precipitation in summer has an abrupt beginning and ending that closely coincides with the marine predominated period. The relatively low average annual snowfall relates to the dry continental winter. Because of the variable influences the coastal section of this W central part of Alaska is frequently described as being part of a transitional climatic zone between marine and continental climates.

(579) Even though the Unalakleet River Valley is broad with no extreme elevations on either side, surface winds are channeled by the valley such that prevailing directions are either E or W. Fall storms moving through the Bering Sea occasionally produce winds of several hours duration blowing from the W with velocities in excess of 43 knots, and because of the low elevation, the village and airport may be flooded by the wind-caused high tides. During winter, flooding does not occur because Norton Sound is frozen from November until about May. In the spring storms with sufficient intensity to produce wind caused floods are rare. Occurrences in summer are also quite rare, but more likely than in spring, especially during the latter part of the season.

(580) **Besboro Island** is 1,040 feet high and very prominent; on a clear day it can be seen from Saint Michael. It affords a poor lee, as the wind draws all around the island. A shoal covered 4 to 4¾ fathoms makes off 2 miles in a NE direction from the N end of the island. The W side of the island is bold-to, and the E side can be approached as close as 0.5 mile, with a depth of over 5 fathoms.

(581) **Shaktoolik River Entrance Light** (64°22'43"N., 161°14'10"W.), 14 feet (4.3 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark on the spit at the entrance to **Shaktoolik River**, 7.5 miles E of Cape Denbigh.

(582) **Shaktoolik** is 4 miles S of Shaktoolik River entrance. Vessels can anchor 4 miles off the village in 7 fathoms, mud bottom. Tugs and barges and small boats beach themselves, or tie off, to the gradually shoaling shale beach near the village, but the approach is extremely shallow and should be made with caution. Some small boats pass over the bar at the mouth of the river and follow the shallow slough on the backside of the spit SE to the village. In 1994, the USCGC IRONWOOD reported very shallow depths in the river entrance and slough. Local knowledge is required. W winds cause considerable surf in the area. A Public Safety Officer, telephone, mail, fuel, and a native store can be found in Shaktoolik. Two local rescue teams can be contacted on VHF-FM channel 5. Daily flights to Nome and Unalakleet are available. Radiotelegraph service is maintained.

(583) **Cape Denbigh** is a moderately high rounded hill, joined to the mainland by a low narrow neck. The head of the bight, E of the cape, is shoal, but in the approach the water shoals gradually. A good anchorage in NE winds can be had E of the cape in depths suitable to the draft of the vessel. The S end of the cape is bold-to, and its W side, 2.5 miles N of the point, can be approached close-to in 4 fathoms. The water shoals rapidly inside to a depth of 4 fathoms when approaching the shore.

(584) Protection from E weather is found in the lee of **Reindeer Hills**, just NNE of Cape Denbigh.

(585) **Norton Bay**is generally shoal. About midway between **Point Dexter** and **Bald Head** is a depth of about 6 fathoms, and from this depth the water shoals gradually as the shores are approached in any direction inside of Bald Head. In some places the 6-foot curve is 5 miles or more from the beach. The N shore of the bay for 15 miles W of Bald Head is comparatively low, and the water is shoal for some distance from the shore. From a point 15 miles W of Bald Head to Cape Darby

the land is high and wooded along the coast; a few native villages are found in this stretch. For 20 miles NE from Cape Darby, a depth of 4 fathoms can be taken 0.3 mile from the shore, and in some places much closer. The water shoals gradually on approaching the coast, but the S and E sides of Cape Darby have deep water close-to. During strong N winds the water is lowered considerably in Norton Bay.

(586) The entrance to **Koyuk River**, flowing into the NE end of Norton Bay, is marked by seasonal buoys; local knowledge is required to enter the river. The village of **Koyuk**, on the N side of the mouth of the river, offers telephone, mail, fuel, stores, a Public Safety Officer, and a volunteer search and rescue group. Daily flights to Nome are available. The village can be contacted on VHF-FM channel 10 by calling "Public Safety Koyuk."

(587) Small boats land or moor in a narrow channel that separates the spit at **Moses Point**, 13.1 miles WSW from Bald Head. An aero radiobeacon is just W of the channel. Small boats from the native village of **Elim**, about 7.5 miles to the SW, beach themselves at Moses Point, or anchor in the small bay just off the village. Vessels can anchor to a hard bottom with good holding ground about 1 mile off the village in 4½ fathoms of water. Services available in Elim include telephone, mail, fuel, store, small medical clinic, Public Safety Officer, and daily flights to Nome. The village can be contacted on VHF-FM channel 11 by calling "City Office Elim," or "Public Safety Elim."

(588) **Cape Darby** is the S extremity of **Kwiktalik Mountain.** The cape is high and rounded terminating at the water in steep rocky bluffs.

(589) **Rocky Point** is a high bold promontory with irregular rocky cliffs. **Rocky Point Light** (64°23'53'N., 163°09'00"W.), 175 feet (53.3 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark at the W entrance to Golovnin Bay.

(590) **Golovnin Bay**, on the N side of Norton Sound, has its entrance between Cape Darby and Rocky Point, with a width of 10 miles. It extends in a general N direction for 12 miles to the entrance to Golovnin Lagoon. The E shore is high and bold, with occasional sand and gravel beaches.

(591) **Carolyn Island**, low and rocky, is 0.2 mile off the E shore, about 8 miles N of Cape Darby.

(592) The W shore of Golovnin Bay for about 3 miles N of Rocky Point is high and bold, but beyond this is a low sand beach with a prominent point about 5 miles N of Rocky Point. The head of the bay on the W side of the entrance to Golovnin Lagoon is between a sandspit projecting from the E shore and a low sand island extending N from the W shore and connected with it at low water.

Tides and currents

(593) The tidal current in Golovnin Bay is chiefly diurnal. The current velocity is about 0.5 knot off Carolyn Island; floods N and ebbs S.

(594) Deep water can be carried close under Cape Darby and Rocky Point. E of Rocky Point is an extensive middle ground on which the least depth found was 23 feet; on its E edge it rises abruptly from 36 to 42 feet. Except for this middle ground, the bay is free from dangers S of the low point on the W shore, the deepest water being on the E side, and ranging from 66 feet close under Cape Darby to 24 feet 0.5 mile NW of Carolyn Island. In the S part of the bay the highland may be approached closely, but off the low land the 18-foot curve is in places nearly 1 mile offshore.

(595) In 1952 the Bureau of Indian Affairs ship NORTH STAR reported striking a submerged object in 64°20'N., 163°06'W., about 4 miles SSE of Rocky Point; the vessel was drawing about 21 feet.

(596) In the N part of the bay an extensive shoal, with 4 to 9 feet, makes out in a NE direction from the W shore to within 0.8 mile of the E shore; its extremity is about 2 miles 093° from the N point of South Spit on the S side of the entrance to Golovnin Lagoon. The channel leading to the entrance to Golovnin Lagoon is on the E side of the bay, passing around the E end of the shoal and following the E shore at a distance of 0.4 to 0.7 mile, with an average width of 800 yards. The least depth in the channel is 13 feet, but 15 feet has been taken in at high water. The diurnal range of the tide is 1.8 feet, but this is influenced by the prevailing winds, which have a tendency to bank up the water in heavy S weather and to lower it with N and NE winds.

Anchorage

(597) NW of the N end of South Spit, in the entrance to Golovnin Lagoon, anchorage may be had in 36 to 42 feet, with protection from all winds. For vessels whose size prevents the use of this anchorage, the best is off the point on the W side of the bay in about 24 feet. This is unsafe in S weather, but is the most convenient for communicating with the head of the bay. By shifting anchorage from one side to the other in Golovnin Bay, good shelter is found from E or SW or W winds.

(598) An anchorage with good holding ground in 42 feet is about 7.5 miles NNE of Rocky Point Light. Keep at least 1 mile S of Carolyn Island.

(599) **Golovin**, on the N spit at the entrance to Golovnin Lagoon, is a distributing point for the mining district of the Fish River country. Small boats are beached or made fast to the shore on the N side of the spit. The village has telephone, mail, a school, roadhouse, cold

storage plant, two salteries, several stores, and an airport.

(600) **Golovnin Lagoon** is very shallow and is navigable for small vessels of 3½-foot draft to the mouth of the **Fish River**, which empties into the head of the lagoon. The channel through the lagoon is narrow and tortuous, and local knowledge is required. In 1994, the USCGC IRONWOOD reported significantly greater depths once inside the river. The village of **White Mountain** is just above where the river forks, about 7 miles above the mouth. Above the village, the river reportedly becomes very shallow with several gravel beds. The village provides telephone, mail, fuel, stores, a Public Safety Officer, and daily flights to Nome. The village may be contacted on VHF-FM channel 5 by calling "City Office White Mountain."

(601) For about 22 miles, from Rocky Point to Topkok Head, the land is high and bold, in many places rising abruptly. Beyond this to Cape Nome the coast is low, with high land farther back. Immediately behind this lowland is a large shoal lagoon with two small entrances, the W one called Port Safety. Between Rocky Point and Cape Nome the water is deep and the bottom regular; by giving the shore a berth of 1 mile a depth of 6 fathoms or more will be found.

(602) **Topkok Head** is 22 miles W of Rocky Point, and is the first highland close to the coast E of Cape Nome. Its seaward face rises abruptly from the water 586 feet and is a well-known and conspicuous landmark.

(603) A yellow bluff, 572 feet high, on the E side of **Bluff**, about 6 miles E of Topkok Head, is conspicuous, but not as much so as Topkok Head.

(604) In 1968, it was reported that small craft could find some protection from W winds in indifferent weather in a small cove W of Bluff. The cove can be recognized by a small low house somewhat back from a point. Caution should be exercised in this area to avoid being swept into the cove as a result of sudden wind changes.

(605) **Solomon** is an abandoned mining village at the mouth of the **Solomon River**, 11 miles W of Topkok Head and 17 miles E of Cape Nome. A road runs N to Council and W to Nome via a ferry at Port Safety. The depth on the bar at the entrance and inside **Solomon River** is about 3 feet, but local knowledge is necessary to keep in the best water. In 1968, it was reported that no lights were visible from offshore, and that there were no good marks for entering the river. A large steel warehouse and a few old steel oil tanks were reported to stand on the N side of the river W of the entrance.

(606) It was further reported in 1968, that small craft should make a straight-in approach to the river entrance from well outside. When once inside, however, the river to the W was particularly good, and that small craft could tie up to the shore on either the N or S sides; the N side appeared to be a little deeper.

(607) An anchorage approximately 2 miles offshore in 8½ fathoms, hard gravel and sand bottom, is on the following bearings: Cape Nome **254°**, largest house in village **358°**, Topkok Head **079°**. Use 45 fathoms of chain. The only protection against heavy winds is to stand out to seaward.

(608) **Port Safety**, about 8 miles E of Cape Nome, is a small anchorage for vessels of less than 7-foot draft. The channel is narrow and has a depth of 7 feet. Small vessels can anchor in the narrow sloughs that lead between the flats inside the entrance.

(609) A cable ferry travels across the entrance to Port Safety; minimum vertical clearance of the cables is 3 feet. Sheltered anchorage for several small boats can be had in the entrance outside of the ferry cables.

(610) **Cape Nome** is a bluff about 650 feet high, 1 mile broad, and rounded down to the water on either side, where the land at the shore is low, with higher land farther back. The water off this cape is quite deep. The diurnal range of tide at Cape Nome is about 2 feet.

(611) From Cape Nome to Cape Rodney, the coast, except abreast of Sledge Island, is a comparatively straight stretch of low sand beach, with no projecting points, and higher land some distance back. Abreast of Sledge Island for a distance of several miles the hills slope down to the beach, giving this part of the coast the appearance of a point. The stretch of beach is broken by a number of small rivers. The entrances to **Nome River**, **Penny River**, and **Sinuk River** have shifting bars, but there is generally enough water in the channel over these bars to permit boats of 3-foot draft to enter. When approaching the coast between Cape Nome and Sledge Island, the water shoals regularly and gradually until a depth of 5 fathoms is reached; inside this depth the bottom is irregular, especially near the mouths of the rivers.

(612) A shoal area with a least depth of 7.6 fathoms in 64°20'15"N., 167°09'46"W., is about 27 miles SW of Cape Rodney and another shoal area with a least depth of 6.8 fathoms in 64°18'03"N., 166°44'09"W., is about 22 miles SSW of the cape.

Chart 16206

(613) **Nome**, the metropolis of NW Alaska, is on the beach at the mouth of the **Snake River**, 11 miles W of Cape Nome. A large dish-shaped communications antenna is on the beach at Nome. An aero radiobeacon is 2.5 miles E of Nome (shown on charts 16200 and 16206), and an aerolight is at the Nome Airport.

courtesy City of Nome/Kiewit-Manson

(614) The general anchorage for deep-draft vessels is in 7 to 8 fathoms about 1 mile from the beach abreast of Nome. Vessels of less draft anchor in about 6 fathoms a little closer to the beach. In strong S winds vessels should anchor farther offshore.

(615) The entrance to Nome Harbor has a 2,982-foot (909 m) causeway and a 3,025-foot (922 m) breakwater, both marked by seasonal lights. The City Dock (south) and Westgold Dock (north) are on the causeway with 22 feet (6.7 m) alongside. The City Dock, 200 feet (61 m) in length, handles bulk cargo and fuel deliveries. The Westgold Dock, 190 feet (58 m) in length, exports gravel and handles the loading and unloading of heavy equipment.

(616) Buoys mark the channel from the outer harbor entrance to the inner harbor. A barge ramp is in the inner harbor on the W side of the Snake River. The Small Boat Harbor, South Dock, East Dock and Fish Dock are on the E side of the harbor. The Small Boat Harbor has a 120-foot (36 m) floating dock with moorage for vessels with up to an 8-foot (2.4 m) draft.

Tides

(617) The diurnal range of the tide is 1.6 feet. The water levels are influenced more by the wind than tide. An offshore wind sometimes causes a level of from 2 to 3 feet below mean lower low water for days at a time; a level of 14 feet above mean lower low water has been noted as a result of storms.

Currents

(618) About 2 miles offshore in Nome roadstead the tidal current averages about 1 knot at times of strength. It is chiefly diurnal. The flood sets E, and the ebb NW.

Weather, Nome and Norton Sound Vicinity

(619) The moderating influence of the open water of Norton Sound is effective only from early June to about the middle of November. Storms moving through this area during these months result in extended periods of cloudiness and rain. The nearly continuous cloud cover during July and August results in an average of 45 cloudy, 12 partly cloudy, and only 5 clear days for the 2-month period. During the summer the daily temperature range is very slight. The freezing of Norton Sound in November causes a rather abrupt change

from a maritime to a continental climate. Most low-pressure systems during this period take a path S of Nome, resulting in strong E winds, accompanied by frequent blizzards, with the winds later becoming N and reaching Nome across the colder frozen areas of N Alaska.

(620) Temperatures generally remain well below freezing from the middle of November to the latter part of April; February is usually the coldest month of the year. Temperatures usually begin to rise near the end of February and continue to rise until they reach a maximum in July. Occurrences of below zero (-18°C) temperatures have been noted in every month from October through May. An unusual aspect of the yearly temperature trend is the short period of thawing weather in January. Despite the generally low temperatures, the maximum during the month is often above freezing and the "January thaw"; generally expected by old time residents is a usual occurrence. The extreme maximum for the station is 86°F (30°C) recorded in July 1968 and 1977 while the extreme minimum is -54° F (-47.7°C) recorded in January 1989.

(621) Precipitation reaches its maximum during the late summer months and drops to a minimum in April and May. For a locality with better than 200 days a year with precipitation, average annual precipitation at Nome is light at only 15.8 inches (401.3 mm). Precipitation extremes have ranged from 24.25 inches (616 mm) in 1950 to 7.42 inches (188.5 mm) in 1962. Snow has fallen as early as August, but usually does not accumulate on the ground until the first part of November. Every month has recorded snowfall except July. The accumulated depth increases during November, December, and January, reaching a maximum depth usually in late February or early March. The snow cover decreases rapidly in April and May, and normally disappears by the middle of June. The average annual snowfall is nearly 59 inches (1499 m) with extremes of 102 inches (2591 mm) and 18.6 inches (472.4 mm).

(622) Average wind speeds for each month are not excessive, ranging from around 9 to 10 knots. Severe windstorms do occur with winds over 61 knots recorded several times. Velocities exceeding 61 knots have been recorded during all months from October through March. The strongest gust recorded at Nome was 62 knots in December 1977. These strong winds during the winter when there is snow cover produce blowing snow conditions that severely hinder transportation in the area.

(623) (See page 524 for **Nome Climatological Table**.)

(624) Navigation is difficult because of the ice from early December to early June and is usually suspended from late December to mid-May.

(625) The National Weather Service maintains a weather station at the Nome Airport and monitors VHF-FM channel 16 (156.80 MHz) and 2182 kHz.

Quarantine

(626) Quarantine is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, chapter 1.) A hospital is in Nome.

Supplies

(627) Water and some provisions can be obtained. Diesel oil is not available in large quantities.

Communications

(628) Nome maintains radiotelephone and radiotelegraph communications with other parts of Alaska and the world. Air service for passengers, mail, and freight is available the year round. Steamship service is available during the summer. From Nome, roads extend to Council, Teller, and to the Kobuk River S of Taylor.

Chart 16200

(629) **Sledge Island**, 31 miles W of Cape Nome and 4.5 miles offshore, is a rocky flat-topped island except near the S extremity where the highest point, a 760-foot jagged mountain, exists. Ruins of abandoned habitations are on the sandspit on the N end of the island and along the beach about midway of the E side. These are probably ruins of the former village of **Aziak**. Except for the sandspit, the shores of the island are rocky and steep.

(630) **Sledge Island Light** (64°29'47"N., 166°11'56"W.), 32 feet (9.8 m) above the water, is seasonally shown from a skeleton tower with a red and white diamond-shaped daymark on the N point of the island. The island may be safely approached from any direction except the E where a depth of 3 fathoms is 0.9 mile E of the light. Small vessels seeking shelter close in on the N side are cautioned to stay clear of the submerged bar making off NW from the spit. It was reported that the cove just W of the spit provides a good anchorage. A depth of 6½ fathoms is about 3.7 miles offshore and about 7.5 miles E of Sledge Island. The passage between Sledge Island and the mainland has irregular bottom but has depths of 5 fathoms or more. Tide rips have been observed in the passage and on the E side of the island during heavy weather.

(631) With heavy S winds, vessels at anchor in the Nome roadstead usually seek shelter behind Sledge Island. Ice is reported to hang on longer in this area than to the E toward Nome.

Current

(632) Current observations were made in the passage between Sledge Island and the mainland for a period of 6 days in July 1950. The tidal current is diurnal with average velocity at strength of NW current of 1 knot and average velocity at strength of SE current of 0.5 knot. Maximum velocity observed during the period of the observations was about 1.5 knots setting NW. (See Tidal Current Tables for predictions.) Vessels when in this vicinity should give special attention to the currents. Above Cape Rodney there is no perceptible current S or E; the general set is N and W.

(633) From **Cape Rodney** to **Cape Douglas**, the shore is a low sand beach, and the high land is farther inland from the beach than E of Cape Rodney. This coast is seldom approached close-to; the water is comparatively shallow and dangerous, shoals and ledges are found between Cape Douglas and Point Spencer.

(634) Vessels are cautioned to exercise care when approaching the shore S of Cape Rodney and to give the shore off Cape Douglas a berth of at least 15 miles; an irregular bottom with depths of 6 fathoms has been found by reconnaissance lines off this cape with indications of lesser depths inshore. From a point about 8 miles NE of Cape Douglas the area to the N, covering the approaches to Port Clarence, has been surveyed.

(635) **Cape Rodney Light** (64°38'35"N., 166°23'47"W.), 24 feet (7.3 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark on the point.

(636) **King Island**, 1,196 feet high, is about 34 miles W of Cape Douglas. It is triangular in shape, about 1.5 miles long and about 1.2 miles wide, rugged and rocky, and has nearly perpendicular cliffs, deep water, and generally rocky bottom on all sides. **Ukivok** is a native village on the S side, the houses being built in the sides of the cliffs some distance above the water. Off the village, but close inshore, vessels may anchor in about 15 fathoms, muddy bottom, with good protection from NW winds. In clear weather the island is an excellent landfall for vessels coming from S and bound to Port Clarence.

(637) **Cape York** (65°25.0'N., 167°30.0'W.), is a high, rocky, nearly vertical cliff, with numerous ravines and a range of high rugged mountains immediately back of it. The cliff is about 10 to 12 miles in extent. There is no distinct promontory, and no exact point along the cliff that can be defined as the cape.

(638) The area from Cape York to Port Clarence has been surveyed with no depth less than 6 fathoms being found 1.5 miles from the shore. The general depths fall off to a submarine valley about 2 miles offshore, extending E, with depths of not less than 10 fathoms, to within 6 miles of the entrance to Port Clarence. A rock is reported about 0.8 mile from the shore SE of **York** village.

(639) Between Cape York and the high land of Cape Prince of Wales is a bight, with comparatively low rolling land back of it, that extends across the peninsula to the N shore. The beach is low, and the water shoals gradually when approaching the shore. The E part of the bight is slightly shoaler than the W part; about 6 fathoms will be found 1 mile offshore; in the W part of the bight 8 fathoms will be found at the same distance from the beach. When standing W alongshore, and when abreast of Cape Mountain, the water deepens suddenly to 20 fathoms.

Chart 16204

(640) **Port Clarence**, a large bay indenting the Seward Peninsula about 35 miles SE of Cape Prince of Wales, provides the only good harbor close to the Bering Strait. The bay is formed by a low sandspit which extends from the mainland in a N direction for about 10 miles to **Point Spencer**. The highest elevation on the spit is a round knoll near the S end, 24 feet above sea level. This knoll is inconspicuous except at close range. Near Point Spencer, at the broad part of the spit, are several buildings and structures of a loran station, the most prominent of which is a 1,365-foot loran tower. NOAA Ship DISCOVERER reported that the loran tower had a maximum useful radar range of 16 miles. The Coast Guard maintains a lighted airstrip year-round at the station and monitors 2182 kHz and VHF-FM channels 16 and 22. Four green fuel tanks on the spit are visible from the E.

(641) **Point Spencer Light** (65°16'38"N., 166°50'56"W.), 22 feet (6.7 m) above the water, is shown seasonally from a skeleton tower with a red and white diamond-shaped daymark on the N end of the point at the entrance to Port Clarence. Except for the light and loran tower, there are no conspicuous landmarks to aid the navigator in making the entrance into Port Clarence.

(642) The channel between Point Spencer and **Point Jackson** on the N shore is 4 miles wide, free of dangers, and with depths of 42 to 48 feet. The N half of the bay has a general depth of 42 feet as close as 1 mile from shore and depths shoal gradually to the beach. The only danger is a visible wreck about 125 feet (38 m) south of the coastline in 65°20'04"N., 166°44'37"W. The S half of the bay shoals gradually to the bars and flats along the low shoreline at the S end. Along the W side of the bay the sandspit may be approached fairly close except for the shoal 2 miles S of Point Spencer which makes into the bay from the spit with depths of 15 feet 1 mile off. To

the E the water shoals to the entrance to **Grantley Harbor**, which is connected with Port Clarence by a narrow channel marked by **Grantley Harbor Light** (65°16'36"N., 166°20'52"W.), 15 feet (4.6 m) above the water, which is seasonally shown from a tower with a green and white diamond-shaped daymark on the N side of the entrance to the harbor. The controlling depth in the channel is not more than 10 feet. The channel is subject to continual change; local knowledge is advised. The current is strong with many eddies and tide rips.

Anchorage

(643) Anchorage with good holding ground is available anywhere in Port Clarence. Being very careful in the entrance, shallow-draft vessels will find greater protection in Grantley Harbor.

Routes

(644) In approaching Port Clarence from the S in fog or misty weather, the low sand and shingle spit forming the W side of Port Clarence is not visible until close-to. The best procedure is to make a landfall on King Island from the E keeping in depths greater than 60 feet to avoid the foul ground N from Cape Rodney. From King Island a course may be set a little E of Cape York to within 3 miles of the coast, thence on course **096°** through the entrance into Port Clarence, where good anchorage may be obtained.

Tides

(645) The diurnal range of the tide at Port Clarence is 1.4 feet. This condition, however, is subject to radical changes due to meteorological conditions. Moderate to strong S or SW winds of several days' duration will raise the height of the tide in the area without appreciably increasing the range. This is actually a datum change and is appreciable along the entire S coast of the Seward Peninsula. It is reported that continued strong N winds produce a lowered datum, but to a lesser extent.

Currents

(646) Along the outside coast W of Point Spencer and S of Cape York there is a general W set of 1 to 2 knots. This velocity is appreciably affected by direction, force, and duration of the wind.

(647) Current observations in the entrance to Port Clarence indicate that the velocity seldom exceeds 0.5 knot 2 to 3 miles N of Point Spencer. One mile E of the point, velocities up to 1 knot were observed, the larger velocities generally setting W or N.

Weather, Port Clarence Vicinity

(648) The weather, in general, is better than in the Aleutian Island area, with less fog and fewer bad storms during the short summer navigation season. Fog and high winds are generally of short duration so that it is seldom that planes cannot land at Teller at least once a week. The winter weather is generally better than the summer for plane service, as there is little or no fog during cold weather.

(649) The first surface fog appears after the spring break-up and is of an intermittent character, generally local, and forming and disappearing at intervals as short as one-half hour. As the season advances, the fog is more prevalent, of greater density and longer duration, but in general it offers no serious obstacle to surface navigation.

(650) **Brevig Mission** is a small village on the N shore of Port Clarence about 9.5 miles NE of Point Spencer. Approaches to the village are easily made from any general direction, but approach from the SW is best. There is deep water all the way to the shore at the village, and the gravel beach makes a good landing spot to beach a skiff. The beach at Brevig Mission is steep. The water depths hold fairly consistent until within close proximity to shore. The beach is exposed to winds and weather coming from the S. In these conditions, a beach landing is difficult due to storm surge. Services available in Brevig Mission include telephone, mail, and a store. The village has a Public Safety Officer and volunteer Search and Rescue teams. Several airlines provide daily flights to Nome.

(651) **Teller**, a village about 12 miles E of Point Spencer, is on the base of the S spit at the entrance to Grantley Harbor. The village can be seen from Port Clarence, however, most small vessels and skiffs beach or tie-off to shore on the Grantley Harbor side. Enter Grantley Harbor by heading to the NE corner of Port Clarence until the N and S spits are visible. A seasonal light is near the end of N spit, and a daybeacon is at the end of S spit. In 1994, the USCGC IRONWOOD reported the best water was in the N part of the entrance maintaining a distance of about 100 yards from the N shore. When inside Grantley Harbor, good approach to the village was made by continuing E for another 500 yards then turning S.

(652) There are no piers, wharves, or docks along the shore at Teller. The village has a Public Safety Officer and volunteer Search and Rescue teams. Services available at Teller include telephone, fuel, mail, and a store. The village has airline service which offer daily flights to Nome. In addition, the village has a road that connects with Nome, but is only passable during the summer months.

(653) **Imuruk Basin** (see chart 16200) is a shallow body of water SE of Grantley Harbor; the two are connected by narrow, difficult **Tuksuk Channel**.

(654) **Kuzitrin River** rises in the Seward Peninsula and flows in a W direction about 75 miles to Imuruk Basin. The anchorage for oceangoing vessels is in Port Clarence, the head of navigation for powerboats and other vessels up to 12 feet in draft in the mouth of Kuzitrin River. Shallow-draft lighters can navigate the Kuzitrin for about 15 miles to **Shelton**. The river is open from June to October.