hill at the northwestern end of the island, is thickly wooded and 970 feet high. Ridges extend northward and westward from it, and beyond these ridges there is an area of low, flat, wooded country intersected by numerous streams. To the eastward the main ridge extends as the backbone of the island, and from it flat spurs run in a northerly direction, falling steeply down toward the coast from heights of from 700 to 900 feet. Between these spurs there are deep valleys, where streams flow through rocky gorges and discharge into Coral Haven, some of these being navigable by boats for a distance of from ½ to 1 mile.

Mount Gangulua, 5 miles southeastward of Mount Madau, is 1,440 feet high and thickly wooded. There is another hill of nearly equal height 1 mile northwestward of it.

Mount Soladuaga, 6½ miles eastward of Mount Gangulua, attains a height of 1,465 feet. Between these two mountains the range curves to the southward, and nearly the whole of the drainage falls into a valley forming the Feiori River, which discharges into Coral Haven.

Mount Riu (Rattlesnake), 5 miles southeastward of Mount Soladuaga, is the summit of the island; it is 2,645 feet high, sharp, and rocky.

Mount Imau, situated 9 miles eastward of Mount Riu, is 1,590 feet high, and appears sharp when viewed from the northwestward or southeastward.

Mount Arumbi, the southeastern mountain of the range, is double topped, 1,150 feet high, and slopes gradually down to Cape Siri, the southeastern extremity of the island. Southwestward of Mounts Arumbi and Imau the hills slope gradually to the sea, and the whole of the drainage is concentrated in Iyuba River, a stream which discharges into Dumaga Bay.

Inhabitants.—The island is inhabited by natives and Caucasians. The natives are friendly, timid, and law-abiding, crime being almost unknown among them. Most of the villages are situated in the valley of the Feiori River and farther eastward along the northern coast.

Products.—The island produces betel nut, sago, ginger, yams, coconuts, breadfruit, bananas, and gum.

9–74 CORAL HAVEN (*H. O. Charts 2956 and 2955*) is an extensive harbor bounded to the northward and eastward by Tawi and Rawa Reefs, and to the southward and westward by Tagula and Pana Tinani Islands. The haven is well-sheltered and affords secure anchorage, but it is encumbered with islands and reefs, making navigation in the haven and in the approaches somewhat intricate. From whichever direction it is approached, a good lookout from aloft is imperative.

The haven is accessible from the northward by Hudumuiwa Pass; from the northwestward by the lagoon channel northward of Pana Tinani; from the westward by the channel between that island and Tagula; and from the eastward by Yuma Passage, an intricate channel through Rawa Reef, and by Gold Rush Channel, a still more intricate channel along the northern coast of Tagula, the entrance to which is northwestward of Mount Ima.

Water can be obtained from most of the larger streams flowing into Coral Haven.

Islands and reefs in the haven.—Nimoa (Pig) Island (*southern extremity, 11°19′ S., 153°15′ E., H. O. Chart 2956*), the largest in Coral Haven, lies about 1½ miles southeastward of Pana Tinani Island. This well-wooded and fertile island attains an elevation of 455 feet and has a few villages.

Pana Hoba Islet, 48 feet high and rocky, is situated on the middle of a reef which extends 1½ miles eastward from the north-

eastern extremity of Nimoa Island. There are a few trees on the summit. About one-half of a mile northward of the islet is a coral patch awash, and another 2-fathom patch lies the same distance northeastward of it.

Heiwok Islet lies on the reef which fringes the southwestern point of Nimoa Island. This wooded islet is 103 feet in height. A number of black rocks, just covered at high water, lie on the outer edge of the fringing reef, which projects 300 yards beyond the islet.

Anchorage may be taken in the bay on the western side of Nimoa Island. Its shores are encumbered with reefs, and on its southern side there is a detached patch awash. The bay should not be entered farther southward than to have Sibumbum Islet in range with the southern point of Gudau Peninsula, bearing 281°, or farther eastward than to have the eastern extremity of Pana Tinani in range with the northern point of the bay, bearing about 001°. In this position there is a depth of 11 fathoms, sand and clay, with good shelter from southwest winds.

Middle Reef, the western end of which lies 1½ miles north-northeastward of the northern point of Nimoa Island, is about 1 mile in length by one-fourth of a mile in breadth. Except at the western end the edges are foul, and shoal water extends 1,600 yards southward from the reef toward Pana Hoba Islet, leaving between them a navigable channel 800 yards wide. A coral patch awash lies in the center of this channel.

Observation Reef is situated about 1½ miles east-southeastward of Pana Hoba Islet. A sandbank which covers at high water lies on this reef near its southwestern edge, which is steep-to. A line of reefs extends 1½ miles southeastward from the reef, terminating in a patch with a depth less than 6 feet.

Hygeia Reef, which is a patch awash, lies about 3 miles eastward of Pana Hoba Islet. A coral patch, awash, and a 1-fathom patch lie one-half of a mile northeastward and 1,600 yards northward, respectively, of Hygeia Reef. Nearly midway between Hygeia and Middle Reefs there is another small shoal having its northern end awash.

Sessawai (Dip) Reef, composed of broken coral, 3 feet high, and covered with grass, lies 1.1 miles southward of Pana Hoba Islet, and has deep water all around it.

At 1,200 yards in a westerly direction from Sessawai Reef there are patches of coral, steep-to, with depths of from 2 to 3 fathoms.

9–75 NORTHERN COAST OF TAGULA ISLAND—Bulami Passage.—The western entrance to Coral Haven, between Tagula and Pana Tinani Islands, is divided into two passages by Nieivi Reef. Doga Siusiu, the northern passage, has been described in section 9–61. Bulami, the southern passage, is one-half of a mile wide between the southern side of Nieivi Reef and the reef extending 1 mile westward from Bobohai Point, the northwestern extremity of Tagula Island. It is deep and clear of dangers.

Tidal currents.—The tidal currents set fairly through at the rate of 2 to 3 knots.

Coast.—From Bobohai Point (*11°20′ S., 153°12′ E., H. O. Chart 2956*) to Nepenthes Point, 6 miles east-southeastward, the coast is bordered by mangroves and a narrow fringing reef. A ridge of low, bare hills, the outer peak and lower slopes of which are wooded, terminates at Nepenthes Point. Westward of the point is a bay having depths of from 7 to 12 fathoms close up to the fringing reef, but its northern part is obstructed by McGregor Reefs. A small reef lies close northward of Nepenthes Point, and a patch, awash, lies 1,350 yards 300° from the same point.

Muhua Bay lies close eastward of Nepenthes Point. In the eastern part of the bay

the shore reef projects 800 yards northward from the mangroves and is broken up into patches. The Sahai River flows into the bay and water has been obtained about 1 mile up the river.

Anchorage may be obtained in the bay in a depth of 12 fathoms, mud, with Nepenthes Point bearing 300°, distant 1,200 yards.

Off-lying dangers.—McGregor Reefs *(11°21′ S., 153°16′ E., H. O. Chart 2956)*, lying about midway between Nepenthes Point and from three-fourths of a mile to 1 mile off the coast of Tagula Island, comprise a cluster of coral patches, which partly dry and extend one-half of a mile in an east and west direction. A bank with depths of from 8 to 9 fathoms extends three-fourths of a mile in an easterly direction from these reefs, and between them and the coast there is a ridge having depths of 6 to 9 fathoms.

Minister Patch, with a depth of 3½ fathoms, lies 800 yards northward of the eastern end of McGregor Reefs. Shoal water with a least depth of 6 fathoms extends 1 mile eastward from the patch.

The northern peak of Wanim Island in range with Heiwok Islet (bearing 297°) leads northeastward of Minister Patch.

Hely Bank, on which there are two coral heads with depths of 3 fathoms, has general depths of from 7 to 9 fathoms, and lies 1½ miles north-northeastward of Nepenthes Point.

Escape Rock, a coral head with a depth of 7 feet, is situated 1½ miles 060° from Nepenthes Point and at the western extremity of a line of patches extending 1½ miles westward from Rawa Reef.

9–76 NORTHERN AND EASTERN SIDES OF CORAL HAVEN.—Osasai Islet *(11°22′ S., 153°20′ E., H. O. Charts 2956 and 2955)*, 225 feet high, is situated on Rawa Reef near its southwestern end.

Rawa Reef, which is about 4½ miles in length, forms the southeastern side of Coral Haven. Foul ground extends one-half of a mile from the inner edge of the reef. The reefs curves eastward at its northeastern end and fringes the southern side of Yeina Island.

Yeina (Piron) Island, the western extremity of which lies 4½ miles northeastward of Osasai Islet, is 5 miles in length and 1½ miles in maximum width. A grassy ridge extends along the length of the island and attains an elevation of from 120 to 260 feet. The island is fringed with mangroves, but the eastern end is rocky, with occasional sandy beaches. There is a village on the northern coast close to the eastern end; but owing to the expanse of reef fronting it on all sides, it is difficult to approach.

Meiwa Islet, 80 feet high, lies 700 yards eastward of the eastern extremity of Yeina Island, and there are two rocks, 10 feet high, the same distance eastward of the islet.

Tawi Reef.—The western part of this reef forms the northeastern limit of Coral Haven. It is part of the northern barrier reef and is a continuation of Tawatawa Mall Reef, from which it is separated by Hudumuiwa Passage. The inner edge of the reef almost connects with Rawa Reef, and several patches extend 1 mile westward from the channel which separates them.

The northern or outer edge of the reef extends east-southeastward from Hudumuiwa Passage and joins Rawa Reef off the eastern end of Yeina Island. It is broken and irregular and has narrow passages through which a boat might pass.

Romilly Bank lies immediately within Hudumuiwa Passage. The bank, a narrow ridge of coral, extends 1¼ miles in an east and west direction and has depths of from 1½ to 2½ fathoms.

9–77 Hudumuiwa (Bramble) Passage *(11°16′ S., 153°20′ E., H. O. Chart 2956)*, the northern entrance to Coral Haven, is divided into two channels by a detached

reef with foul ground extending southward from it. The western channel, the better of the two, is about 200 yards in width and carries depths of 8 fathoms; but the reefs on either side of it are shelving. From the inner edges of these reefs, shoals which show green against the deeper water in the fairway, extend about 700 yards southwestward. Within the western horn of the detached reef there is a rock just awash at high water.

The eastern channel, which lies one-half of a mile from the other, has a depth of 6 fathoms; but the eastern part of Romilly Bank, which has not yet been closely examined, stretches partly across its southern end.

Tidal currents in the channels run at the rate of 3 to 5 knots and set fairly through.

9–78 **Directions.**—Bring the southern extremity of Pana Tinani Island in range with the northern extremity of Daddahai Islet, bearing 252°, which will lead to the entrance of the western channel of the passage. Having approached the entrance, bring the southern extremity of Nimoa Island (the point of which will appear low and indistinct) just open northwestward of Pana Hoba Islet, bearing 229°; this will be in range with the center of the passage and exactly underneath a gap between two nipples in the sky line of the hills on Tagula Island. The marks must be watched very closely, as there is but little room to be swept off the range.

Having entered Coral Haven and proceeding westward, the best route is northward of Middle Reef, thence out by Doga Siusiu Passage southward of Pana Tinani Island.

Yuma Passage, the eastern entrance to which lies 2½ miles southward of the western end of Yeina Island, is a narrow, deep, and intricate channel, winding for 4½ miles between Rawa Reef and the reef eastward of it. It connects with Goldrush Channel about 1¼ miles southward of Osasai Islet. The reefs on either side are steep-to, and there are three very sharp turns in the passage. The channel has depths of from 20 to 30 fathoms, but at the southern end there is a charted depth of 4 fathoms. This passage is dangerous for a vessel of any size to attempt, on account of the strength of the tidal currents, which run at a rate of 3 to 5 knots. It is reported to be a good passage for vessels up to 300 tons.

Marx Reef is a detached reef, steep-to on all sides, lying in the bight of the reef between Yeina Island and the northern side of Tagula Island.

Tidal currents.—In Coral Haven the first quarter of the flood sets southwestward, gradually changing its direction to the south, and during the last quarter to the southeast. The first quarter of the ebb sets northeast, changing at the last quarter to northwest. These changes are most marked during spring tides and are similar to those observed in the western part of the archipelago near the sunken barrier.

9–79 **NORTHERN COAST OF TAGULA ISLAND (continued** from section 9–76).—**Goldrush Channel** (*H. O. Chart 2955*), the eastern entrance of which lies 1½ miles southward of Marx Reef, is the southeastern entrance to Coral Haven, and, though deep, is very intricate, and in consequence only suitable for boats. The channel is 8 miles in length and lies between the fringing reef of Tagula Island and the southern side of the reef lying to the eastward of Rawa Reef. The western part between Muhua Bay and Feiori River, 2½ miles southeastward, is from 600 to 1,200 yards wide; but the remainder is only 200 yards in width. A depth of not less than 11 fathoms exists anywhere in the fairway, but the tidal currents are so strong, and there are so many shoals, that the channel is not recommended.

Tidal currents.—The tidal currents run at

the rate of from 2 to 3 knots in the western end of the channel, but considerably more in the narrow part; the flood sets to the westward and the ebb to the eastward.

9–80 Coast.—The coast from Muhua Bay trends east-southeastward for 10 miles to a point running below Mount Ima and forms the southern side of Goldrush Channel. For the first 7 miles it is backed by a low, wooded ridge of hills, and the fringing reef closely follows the shore line. Several coconut plantations were seen in this locality.

Feiori River is the largest on this coast and flows into the sea 4½ miles eastward of Nepenthes Point, the western entrance point of Muhua Bay. It is navigable by boats for nearly 1½ miles from the entrance, and in the valley there are many villages.

The channel across the bar at its mouth is to the eastward of a mangrove islet, and the outer edge of the bar is steep-to.

In the middle of Goldrush Channel, 1,800 yards 333° from the entrance to Feiori River, there are two reefs awash, and one-half of a mile northwestward of these there is a rock with less than 1 fathom of water over it, lying 300 yards from the edge of the reef on the northern side. The southern side of the channel is apparently free from off-lying patches.

Immediately eastward of Feiori River the channel opens out to a basin, 2 miles in diameter, in which there are numerous patches awash, and beyond this it assumes the narrow dimensions described above.

Several other creeks and inlets along this coast have not yet been examined.

9–81 Rabuso (Proclamation) Creek (*11°29′ S., 153°33′ E., H. O. Chart 2957*) is an inlet situated 7 miles eastward of the eastern entrance to Goldrush Channel. It is entered through an opening about 70 yards wide in the fringing reef, and extends in a southerly direction for about 1,400 yards.

Boboa, a mangrove islet on the barrier reef, lies 1½ miles eastward of the entrance to the inlet. A rock, situated 80 yards within the edge of the reef and nearly covered at high water, lies on the eastern side and serves to indicate with certainty the approach to the inlet. It is advisable to place a boat or a mark on each side of the narrow part of the channel before entering.

Anchorage.—Between the two entrance points of the inlet anchorage may be obtained in a depth of 11 fathoms, mud, with swinging room of about 150 yards. The anchor should be dropped as near as possible to the spot indicated on the plan, with the eastern entrance point of the inlet bearing 070° and the western side 163°. The inner part of the inlet has depths of from 8 to 10 fathoms.

Tides.—The high-water interval at full and change at Rabuso Creek is 9h. 25m.; springs rise 5½ feet, neaps 3 feet.

9–82 Coast.—Eastward of Rabuso Creek the coast trends eastward for 8½ miles and then in a southeast direction for 8 miles to Cape Siri, presenting no remarkable features and being mostly low and lined with mangroves.

Barrier reef.—Eastward from Rabuso Creek the fringing reef assumes the character of a barrier, gradually widening its distance from the land and sweeping with a uniform curve around Cape Siri at a distance of from 8 to 12 miles. It incloses an extensive lagoon, the northern and eastern portions of which have not been examined. At 10 miles 052° from Cape Siri there is a passage, about 300 yards wide and open on a 204° bearing, that leads into the lagoon, but it has not been examined or navigated. A reef is reported just inside the opening of this passage. Small vessels should take the north side of the passage. Another opening for small vessels is about 4 miles eastward of Rabuso Creek. There is anchorage inside for vessels up to 100 tons. The lagoon

within the barrier reef is reported to be navigable by vessels up to 100 tons.

Cape Siri or **Sudest**, the southeastern extremity of Tagula Island, is low and wooded, gradually rising toward the northwest. A village is situated on the point; and Mount Arumbi, 1,150 feet high, lies 6½ miles northwestward of the cape.

9–83 SOUTHERN COAST OF TAGULA ISLAND.—Cape Baganowa (*11°39′ S., 153°33′ E., H. O. Chart 2955*), lying 12½ miles westward of Cape Siri, is the southernmost point of Tagula Island, and is dominated by a conical hill, 490 feet high, situated 1 mile northward of it.

The peninsula of which it forms a part projects from the mainland in the form of a boot and is connected by an isthmus of low grassy hills, less than one-half of a mile across. There are numerous groves of coconut palms on the peninsula, and its western end is low and swampy. A large village stands on its southwestern side.

Lawik Reef is the name given to the southern side of the barrier, which, sweeping around Cape Siri, trends westward and passes southward of Cape Baganowa at a distance of 3 miles.

Between Cape Siri and Baganowa the lagoon inside the barrier reef is from 2½ to 6 miles wide. It has only been partially examined, but it appears fairly clear of dangers, and is navigable with the sun in a favorable position.

A sunken rock lies 3 miles east-southeastward of Cape Baganowa, and there are some coral patches lying about 2 miles off the fringing reef between Cape Siri and Point Lamada, situated 6 miles westward.

Deijei radi (Johnston) Pass, lying 238° from Cape Baganowa and being three-fourths of a mile in width, is a deep clear channel through the barrier reef.

The summit of Mount Imau, bearing 025°, just open westward of the western extremity of Baganowa Peninsula, leads through the pass.

Tidal currents.—The tidal currents set through Deijei radi Pass with a velocity of up to 3 knots, the flood to the southwestward and the ebb to the northeastward, both somewhat diagonally across the channel.

Dumaga Bay is formed between the western side of Baganowa Peninsula and the mainland.

Venama Islet lies close offshore on the fringing reef of the northern side of the western entrance to Dumaga Bay.

Fairfax Reefs, a group of sunken rocks, lie from 1 to 2 miles westward of the southern entrance point of Dumaga Bay. There is a deep water channel, 800 yards wide, between the easternmost patch and the fringing reef of the western side of Baganowa Peninsula.

Half a mile northeastward of Fairfax Reefs and 1,200 yards westward of Baganowa Peninsula, there is a detached reef, awash, with a channel 600 yards wide between it and the fringing coastal reef. About 400 yards northwestward of this reef and connected with it by a ridge of shallow water is a 1½-fathom shoal. Another shoal with a depth of 3 fathoms or less lies 800 yards north-northeastward of the first-mentioned reef.

9–84 Anchorage — Directions. — Anchorage may be obtained in Dumaga Bay in a depth of 14 fathoms, mud, distant one-half of a mile from the shore, with the conical hill, 490 feet high, on Baganowa Peninsula bearing 131° and the western extremity of the peninsula 221°.

The bay is, however, somewhat difficult of access. Owing to the strength of the tidal currents and the irregularity of the bottom, the passage between Baganowa Peninsula and the Fairfax Reefs is only practicable during slack water, and with the reefs clearly

visible, and as the approaches to Dumaga Bay have not been thoroughly sounded there may be other shoals in this vicinity.

The clearest approach appears to be from the westward, skirting the fringing reef at a distance of from 400 to 600 yards and anchoring as above directed.

Lijiliji Bay, lying 6 miles west-northwestward of Dumaga Bay, is 1½ miles wide at its entrance and open to the westward. A tongue of reef extends to the center of the bay from its northeastern shore. A reef, the edge of which is steep-to, projects one-half of a mile westward from Juru Point, the southern entrance point of the bay.

Anchorage may be obtained southward of the reef which projects to the center of the bay in a depth of 14 fathoms, sand, with Juru Point bearing 176°, distant 1,600 yards.

Tides.—The high-water interval at full and change at Lijiliji Bay is 9h. 25m.; springs rose 5½ feet, neaps 3 feet.

9–85 **Baumum Bay,** situated immediately westward of Lijiliji Bay, is separated from it by a narrow point. A reef extends about 1,600 yards southward from the point, and a charted sunken rock lies southward off the extremity of the reef. This bay does not appear to afford any anchorage.

Pantawi Point (*11°33′ S., 153°21′ E., H. O. Chart 2955*), 4½ miles westward of Baumum Bay, is a low point, behind which there is a series of rocky peaks on the ridge sloping down from Mount Riu, the summit of Tagula Island. One mile eastward of this point the shore reef extends 1½ miles from the coast, and one-half of a mile southeastward of the southern extremity of the reef there is a detached coral reef, awash, with a patch of sunken rocks close northward of it.

Maduwa Point, situated 6 miles northwestward of Pantawi Point, is the southwestern extremity of a narrow peninsula with two peaks on it. These peaks are three-fourths of a mile apart; the southwestern is 605 feet high, the northeastern 770 feet. They are connected by a saddle, and both are thickly wooded with the exception of a few bare spurs on their northern sides. A reef extends about 2 miles southward from the point.

9–86 **Badabada Bay,** a deep bight in the coastal reef, lies immediately westward of Pantawi Point. The bay is protected from the southeastward by the reef extending southwestward from Pantawi Point. A tongue of reef extends 1¼ miles westward from the northwestern entrance point of the bay, and foul ground extends 800 yards beyond the extremity of the reef.

Anchorage may be obtained in the center of this bay in a depth of from 8 to 10 fathoms, sand.

9–87 **Hinai Bay,** lying between Pantawi and Maduwa Points, indents the coast to a distance of about 4 miles. The inner part of the bay has not been closely examined but appears to afford anchorage. From both sides a tongue of reef projects into the bay; and near the center, about 3¾ miles eastward of Maduwa Point, there is a rocky patch. Hula River flows into the head of the bay.

This bay must be approached with caution, as a long line of patches extends 1½ miles southeastward from the southern extremity of Maduwa Point Reef, and after a break, three-fourths of a mile wide, continues for one-half of a mile farther in the same direction. The break just mentioned probably affords the best entrance to the bay, as the shoals may be seen on either side. The passage into the bay eastward of the extremity of the line of patches was not examined but appeared quite clear.

Barrier reef.—The inner edge of the barrier reef between Smiths Pass and Deijei radi Pass has been traced 3 miles westward of the latter pass. Except those already mentioned, no dangers obstructing naviga-

tion were discovered between Cape Baganowa and Maduwa Point.

The navigable channel is narrowest southward of Pantawi Point, where a series of yellow patches near the inner edge of the barrier reef begin. The northernmost of these lies 3 miles southward of Pantawi Point, with another patch lying 2.1 miles 104° from it. A patch also lies 4 miles 206° from Pantawi Point, and 1¼ miles northward, and 2 miles northwestward of it are depths of 3 fathoms. The position of these shoals will be best seen on the chart.

Tidal currents.—Between this part of the barrier reef and Tagula Island, the approximate direction of the flood current is to the southwestward, and the ebb to the north-northwestward.

9–88 **Smiths Pass** (*11°40′ S., 153°14′ E., H. O. Chart 2955*), situated about 10 miles southward of Maduwa Point, is a clear channel through the barrier reef. The channel is about three-fourths of a mile in width and has a least depth of 5 fathoms. Three coral patches lies within the pass on the western side. A large reef is situated 3½ miles westward of the pass and close southward of the barrier reef.

Bousquet Bay is formed by the northwestern side of Point Maduwa Peninsula and the mainland. The approach and the bay are obstructed by reefs, for which see the chart.

Shallow Bank, composed of coral and having several rocky heads with depths of less than 6 feet, lies 2 miles westward of Maduwa Point, and is 600 yards in length. About midway between the bank and the point is a reef, which dries on its eastern side.

Westward of Shallow Bank and between it and Samumu Reefs there is a reef. The reef always shows and is fairly steep-to on the eastern side, but on the western side there are patches to a distance of 1,200 yards. As there appears to be shoal water extending from the southeastern end of Samumu Reefs, it would not be advisable to attempt the passage between them.

The channel between Shallow Bank and the reef westward of it is three-fourths of a mile in width. The western extremity of Iyin Islet, bearing 004°, leads through the middle of this channel.

Samumu Reefs, situated 4½ miles westward of Maduwa Point and between Pana Man and Hui Waditimo Islets, extend 6 miles in an east and west direction.

Hui Waditimo (Chaumont) Islet, a mass of dead coral, lies 7 miles west-southwestward of Maduwa Point and on the eastern end of a reef which has not been examined. This position is only approximate. The islet is covered with a few stunted bushes, about 5 feet high.

9–89 **Iyin (Garden) Islet** (*11°27′ S., 153°14′ E., H. O. Chart 2955*), lying 3¾ miles northwestward of Maduwa Point, is separated from the fringing reef of the mainland by a narrow channel which is encumbered by reefs northward of the islet. The reef on which the islet stands extends three-fourths of a mile from the southeastern side of the islet. The islet consists of a grassy ridge of hills, 170 feet high, surmounted near the southwestern end by a clump of trees.

Anchorage.—There is good but rather confined anchorage, even for a small craft, in a depth of 7 fathoms, sand and mud, off the western side of Iyin Islet, with the western entrance point of the bay northward of Iyin Islet, bearing 049°, and the northern shoulder of the northeastern hill on Maduwa Point, bearing 127°, open southwestward of the southern end of Iyin Islet. This anchorage is in smooth water and out of the tidal currents.

Onagom Reef, which is steep-to, lies about midway between Iyin and Pana Man Islets. A 4-fathom patch is situated midway be-

tween this reef and the narrow reef southward of it.

Pana Man Islet, situated 3½ miles westward of Iyin Islet, lies on the southern end of a reef, which, under the name of Bagana, extends in patches for 2 miles northwestward and over 1 mile northeastward from the islet. The islet is 200 feet high, thickly wooded, and uninhabited.

Bilobei Reef lies about 1½ miles northward of Pana Man Islet and is horseshoe-shaped, with the opening to the northwestward. The channel between it and the extremity of the reef extending northeastward from Pana Man Islet is 800 yards wide, but the edge of the latter reef has shallow water extending from it to a distance of from 200 to 400 yards. Bilobei Reef is fairly steep-to, but off its eastern side there are two patches.

There is a clear channel, three-fourths of a mile wide, between this reef and the shore reef of Tagula Island, and has a depth of 12 fathoms.

Inskip Reefs, a series of reefs awash, lie from 2¾ to 4¾ miles northwestward of Pana Man Islet. Between Inskip and Samumu Reefs there are several shoals.

Dangers.—The area between Inskip and Samumu Reefs on the north and the barrier reef on the south is encumbered with many reefs and shoals.

9–90 Coast.—From the western entrance point of the bay northward of Iyin Islet, a mangrove coast trends northwestward for a distance of 5½ miles to Panawadai Point. Close northward of the point the ridge of hills extending westward from Mount Madau terminates in a wooded summit, 18 feet high.

A broad reef fringes this coast, extending off it in places for a distance of a mile, but approaching close in to the shore at the heads of two bights situated between Iyin Island and Panawadai Point.

Hosiai Point (*11°24′ S., 153°11′ E., H. O. Chart 2955*) divides the two bights that are situated along this coast. These two bights are encumbered with detached reefs. The coastal reef projects 1 mile from the point and two sunken rocks lie close off the extremity of the reef.

Guide Reef, a rocky patch with depths of from 1 to 2 fathoms, lies 2 miles westward of Hosiai Point, and usually shows fairly well. A sunken rock is situated about 1 mile southwestward of the reef.

Shark Reef, a coral patch which dries, is situated 3½ miles westward of Hosiai Point. The following patches lie near Shark Reef: A patch with depths of from 2 to 2½ fathoms one-half of a mile westward of the reef; a patch with depths of from 1½ to 5 fathoms 1½ miles southwestward of the reef; a 2¼-fathom patch and a 3-fathom patch 2¾ miles westward and 2½ miles northwestward, respectively, of the reef.

9–91 Anchorages.—Anchorage may be obtained by small vessels with local knowledge in the southern part of the bight on the northwestern side of Hosiai Point in depths of from 6 to 7 fathoms, sand and mud. This anchorage is out of the influence of the tidal currents and is sheltered from southeasterly winds.

The anchorage should be approached with Mount Madau bearing 055°, which leads in between some patches of reef, and when the southwestern hill over Maduwa Point comes in range with the summit of Iyin Islet, bearing 139°, the anchor may be dropped in 6 fathoms of water.

Anchorage also may be obtained by small vessels with local knowledge in the bight on the southeastern side of Hosiai Point in a depth of about 8 fathoms, with Maduwa Point bearing about 142°. Care should be taken not to shut out Maduwa Point behind Iyin Islet.

9–92 Directions.—The clearest route along this coast is to pass close southward of Guide Reef and thence follow the shore reef

as far as Iyin Islet. The northern shoulder of the 770-foot or northeastern hill over Maduwa Point open southwestward of Iyin Islet, bearing about 127°, leads close southwestward of Guide Reef and northeastward of Bilobei Reef.

9–93 **Coast.**—The coast of Tagula Island trends northward from Panawadai Point for 1¼ miles to Hohunawai Point, and thence northeastward for 1½ miles to Bobohai Point, the northwestern extremity of the island. A reef nearly 1 mile wide fringes this part of the coast. There are a few villages at this end of the island, but the inhabitants did not appear to be numerous.

Vehi Reef (*11°21′ S., 153°09′ E., H. O. Chart 2956*), which dries, lies 1½ miles westward of Hohunawai Point.

Reef Two is situated 6½ miles westward of Hohunawai Point. The reef is steep-to and has a drying sand bank on its end.

Remora Reef, the position of which is approximate, is charted about 2 miles west-southwestward of Reef Two.

9–94 **ROSSEL (YELA) ISLAND** (known in Tagula Island as Rua), the easternmost of the Louisiade Archipelago, is situated 19 miles northeastward of the eastern extremity of Tagula Island. The island is 18 miles in length in an east and west direction, and has an average breadth of 6 miles.

9–95 **Aspect.**—Mount Rossel (*11°21′ S., 154°14′ E., H. O. Chart 2957*), 2,750 feet high, lies near the eastern end and is the summit of the island. This precipitous peak has steep ridges extending to the northward and westward, but descends in more gentle slopes southeastward to Cape Deliverance, the eastern extremity of the island. Four miles westward of Mount Rossel is a rounded peak, 2,000 feet high, and here the main ridge divides. Chaude Peak, 1,450 feet high, is situated on the northwestern ridge, which terminates in a bluff point. The southwestern ridge has two conspicuous peaks, each 1,800 feet high; the eastern of these, Mount Mo, is flat-topped; the western is conical. An extensive bay lies between these ridges. At the western extremity of the island is a well-defined conical peak, 1,140 feet high.

Rossel Island is thickly wooded. There are occasional grassy patches on the southern and southeastern sides. Excepting the high peaks to the eastward, the mountain ridges form short, narrow crests, but their outline is smooth. The rock nowhere is exposed, even the steepest ridges being covered with vegetation. Coconut trees grow in very small groups, and most of the shores are either bordered by mangroves, with occasional sandy beaches, or clothed with the prevailing jungle. Nearly the whole of the southern coast is a dense forest.

The higher parts of the island are almost constantly cloud capped during the southeast monsoon.

Inhabitants.—The natives are distinctly of the Papuan race, the average type of face and form clearly belonging to that stock. The language in use on the northern side of the island is quite different from that on the southern side, and both are quite different from that of the inhabitants of Tagula and other islands. The natives grow small quantities of vegetables and fruit for their own use, and there are no large tracts under cultivation. The villages are small and scattered.

Barrier reef.—From a position about three-fourths of a mile northward of Gwainyu Point, the northwestern point of the island, the barrier reef extends in a westerly direction for 23 miles, where it turns southwestward for a further 5 miles. A similar reef extends 20 miles westward from a position about 1½ miles southward of West Point, the western extremity of the island. These two barrier reefs enclose a large area of

water known as Rossel Lagoon, and their western extremities are about 2 miles apart.

9–96 Southern coast of Rossel Island.—Between West Point and Southwest (Vamba) Point, 4 miles southeastward, the coast is rocky, steep, and rugged. Two miles northward of Southwest Point is a conical peak, 1,800 feet high. The coast then takes an easterly direction for 5 miles to Govia Bay, which is filled with a reef, except in the outer part, where there is possibly a boat entrance. Between Govia Bay and the southeastern point of the island are Nyebe Bay and other indentations.

9–97 Tree (Ngea) Islet (*11°24′ S., 153°59′ E., H. O. Chart 2957*), 40 feet high, lies 1¼ miles southward of West Point and on the barrier reef.

Reef.—Eastward of Tree Islet the barrier reef assumes a fringing character, extending from ½ to 1 mile offshore as far as Govia Bay. Between Govia Bay and the southeastern point of the island the fringing reef extends nearly 2 miles offshore. The sea breaks heavily on the reef during the southeast monsoon period.

Openings.—There are several passages, about 200 to 800 yards wide, through the reef. The passages have not been examined, but are reported to be available for small vessels. The principal ones are named Ye, Dowa, and Gware; the latter leads to an anchorage with depths of from 3 to 5 fathoms off Avaletti, where there is a prominent house. Gware Passage, which lies about 2 miles southeastward of Tree Islet, leads into an anchorage for vessels up to 200 tons.

Rossel Spit.—A triangular barrier reef fronts the coast between the southeastern point of Rossel Island and Cape Deliverance, 3 miles north-northeastward. **Adele (Boloba or Loa) Islet,** lying 8 miles east-southeastward of Cape Deliverance, marks the apex of the reef. The islet, 130 feet high, has two conspicuous clumps of palms, one in the center and the other at the western end. The outer edges of Rossel Spit are apparently steep-to, depths of 200 fathoms existing at a distance of one-half of a mile. The lagoon within Rossel Spit has many reefs.

Eastward from Cape Deliverance there is a passage, with a depth of 2 fathoms, through the northern side of the barrier reef. This opening which leads into the lagoon has not been closely examined and is reported to be encumbered with shoals. The only other opening is a passage about 8 miles westward of Adele Islet.

Wrecks.—The wreck of a vessel (tanker) above water lies on Rossel Spit, about 4¾ miles northwestward of Adele Islet. Another wreck lies on the reef about 3½ miles southwestward of the islet.

Current.—A very strong west-northwesterly current was experienced when rounding Adele Islet from the northward.

Off-lying shoals.—A breaking shoal, about 1 mile in extent, has been reported to lie about 30 miles 113° from Adele Islet. The depth was not ascertained.

An obstruction has been reported in a position 40 miles 104° from the eastern extremity of Adele Islet.

Breakers were reported (1956) to lie from about 4 miles northeastward to 5½ miles eastward of Adele Islet. They extend about 4 miles in a general northwest-southeast direction.

Two banks, with depths of 39 and 40 fathoms, were reported, in 1946, to lie about 30 miles east-southeastward and eastward, respectively, of Adele Islet. The area between the two banks has not been examined.

9–98 Northeastern coast of Rossel Island.—The coast northwestward of Cape Deliverance is composed principally of mangroves, and fronted by a coastal reef to a distance of about 1 mile. The reef has several openings, which, with the exception of Pwennegwa Harbor, have not been examined. Off the low northern extremity of the island the coastal reef is about 2 miles in width.

Cape Deliverance (*11°23′ S., 154°18′ E., H. O. Chart 2957*), the eastern extremity of the island, is a low rocky point, dominated

(5883) **NEW GUINEA—Louisiade Archipelago—Rossel Island—Wreck information.**—A stranded wreck (150 foot fishing vessel) will be charted about 4.6 miles 089° from the 800 foot summit (11°23′40″ S., 154°16′10″ E.) on the south-east coast of Rossel Island.

(N.M. 37/66.)

(N.M. 31(313), Sydney, 1966.)
H.O. Chart **2955.**
H.O. Pub. 73, 1952, page **356.**

by a hill, 800 feet high, which slopes gradually to the coast. Diama Islet lies close eastward of the cape on the fringing reef.

9–99 **Pwennegwa Harbor** (*plan on H. O. Chart 2957*), the entrance to which lies 1½ miles northward of Cape Deliverance, is an opening in the coastal reef. The opening extends seven-eighths of a mile in a southwesterly direction, and the entrance is one-eighth of a mile in width. In the entrance no bottom was found at a depth of 18 fathoms. The coral flats, dry on either side, and there is a boulder, probably always uncovered, about 200 yards southward of the southern entrance point. Fresh water may be obtained from a stream which flows into the head of the harbor.

Anchorage in depths of from 9 to 10 fathoms, mud, may be obtained near the head of the harbor, where it is about 500 yards wide.

Tides.—The high-water interval at full and change at Pwennegwa Harbor is 11h. 00m.; springs rise 4 feet.

Observation Rock, 10 feet high, lies 2 miles north-northwestward of the entrance to Pwennegwa Harbor and one-half mile offshore.

Immediately southeastward of the rock there is an opening in the coastal reef. The opening widens towards the head, where anchorage might be obtained by small vessels. A deep ravine from the mountains drains into the head of this opening.

Warunga Passage, an opening in the coastal reef, lies 1½ miles northwestward of Observation Rock.

Heron Opening, the entrance to which lies about 3 miles northwestward of Observation Rock, is a lagoon-like fissure in the coastal reef. The opening, encumbered with reefs, was entered by a vessel, but the navigation was found to be extremely intricate.

Heron (Wola) Islet, 30 feet high to the top of the bushes, lies on the northern entrance point of Heron Opening. Foul ground exists 800 yards east-northeastward of Heron Islet. A boulder above water lies on the southern entrance point of Heron Opening.

Anchorage in a depth of 13 fathoms was taken in the lagoon of Heron Opening.

9–100 **Northern coast of Rossel Island.**—From the low northern point of the island the coast trends westward for 9 miles to Gwainyu Point, a bluff point forming the northwestern extremity of the island. There are four ravines on the northern side of the mountain range, the westernmost of which reaches the coast at the head of Wu Bay, 5 miles eastward of Gwainyu Point. The coast is fronted by a reef, which lies 2 miles off the northern point of the island and gradually diminishes its distance to 1 mile off Gwainyu Point. The lagoon within the reef is encumbered with shoals, as mentioned below. Several huts were seen close to the shore.

Relief Opening, about 400 yards wide, is the only opening in this stretch of the reef and lies about 5½ miles east-northeastward of Gwainyu Point. A British naval vessel entered the lagoon by Heron Opening, but found the navigation too intricate and dangerous along the northern coast, and proceeded to sea by Relief Opening.

9–101 **Western coast of Rossel Island.**—The western side of the island is deeply indented between Gwainyu Point and West Point, forming two bays. The larger bay has several coves.

Wola (High) Island (*11°18′ S., 154°02′ E., H. O. Chart 2957*), lying 1½ miles westward of Gwainyu Point, is grass-covered, flat-topped, steep-to, and 300 feet high. The northern side of the island is fringed by a narrow reef. A dangerous patch of reef lies 1¼ miles southward of the western extremity of the island.

Anchorage in a depth of 12 fathoms, sand, may be obtained in a position about one-

fourth of a mile northward of Wola Island and 2 miles westward of Gwainyu Point.

9–102 Yongga Bay.—Southward of the northwestern point of Rossel Island, a bay extends to the eastward for 5 miles, the head of which is known as Yongga Bay. This bay has general depths of 12 fathoms, mud.

About 2 miles from the head and in the middle of the bay is a 3-fathom patch, and rocky and foul ground lies one-half of a mile southeastward of it. These dangers render access to the inner part of the bay somewhat difficult.

On the northern side of Yongga Bay and separated therefrom by Mbeawe Point is Mbeawe Bay, which is apparently deep.

The southern shore, which has a rocky coast line, consists of alternate bays and points, none of which afford desirable anchorage, the water being deep and the bottom rocky and uneven. The westernmost of these is known as Dixon (Kwaya) Bay; it is larger than the others, but does not afford better anchorage.

9–103 Tryon Bay lies westward of Dixon Bay and is separated from it by a narrow peninsula, which projects 1½ miles northwestward from the mainland. A reef, which nearly dries and is sometimes very difficult to see, lies one-half of a mile southwestward of the northern entrance point of the bay, with which it is connected by foul ground. Rocks with depths of less than 6 feet extend 400 yards westward from the reef. The southern part of the bay is clear of dangers.

Anchorage in a depth of 14 fathoms, sand and mud, may be obtained near the head of the bay, with the northern entrance point bearing 348° and the southern entrance point 261°. The anchorage is protected from all winds, except by those between north and west.

Pawsey Reefs, which nearly dry, lie 1½ miles northwestward of West Point, the western extremity of the island. The reefs occupy a space nearly 1 mile in length. On the middle of these reefs is a rock, a few feet high.

9–104 ROSSEL LAGOON is over 25 miles in length from the northwestern point of Rossel Island to Rossel Passage at the western end, where it has a breadth of 3 miles, increasing to 7 miles toward the island. The barrier reef encircling this lagoon is narrow and has four passages through it westward of the island, but the barrier reef on the southern side of the lagoon is unbroken eastward of Rossel Passage.

The lagoon has general depths of from 20 to 35 fathoms, but numerous scattered shoals lie in it. As the water is clear, they can alway be seen in a good light. Few of the shoals dry and most of the larger ones are nearly awash.

In the barrier on the northern side of the lagoon there are three passages or openings, Swinger Opening and two smaller ones, the latter being 1¾ miles apart. The eastern of these smaller openings is narrow but apparently clear and is situated midway between Swinger Opening and Rossel Passage. The reef is quite narrow at this opening, but an inner horn on the western side, curving to the southeastward, necessitates a sharp turn, and consequently it would probably not be a fit passage for other than small craft. The other opening appears to be merely a boat passage. Neither of these have been examined.

9–105 Swinger Opening (*11°16′ S., 153°58′ E., H. O. Chart 2957*), the entrance to which lies about 6 miles westward of the northwestern point of Rossel Island, is about one-fourth of a mile wide and deep. A narrow horn of reef on each side of the opening extends for more than 1 mile in a southerly direction. The western horn is broken about 700 yards from its southern end by a passage, 300 yards wide, having a depth of 12 fath-

oms. Off the southern end of the eastern horn is a reef with shallow water extending halfway across the main channel from its western end. Another reef lies one-fourth of a mile farther southward and athwart the channel; except off its northern side, there is foul ground all around it.

West point in range with Tree Islet (sec. 9–97), bearing 171°, leads to the entrance of Swinger Opening.

Caution.—Navigation in the channel between the last two-mentioned reefs is intricate, and with a tidal current of 2 to 4 knots it cannot be taken without considerable risk. Swinger Opening has not been completely examined, and therefore may be more dangerous than already stated. The water is clear, and with the sun in a favorable position the dangers should be seen.

9–106 Rossel Passage, at the western end of Rossel Lagoon, is the only safe passage for a vessel of any size. The passage is 1,800 yards wide between the point of the barrier reef on the northwestern side and the edge of a coral reef awash on the southeastern side. Between this coral reef and the western end of the southern barrier there is another reef, also awash, leaving a clear passage about 400 yards wide on either side of it. The sea breaks heavily on both these reefs and also on the barrier. The sides of the reefs are steep-to and the channels are clearly visible.

Anchorage.—Anchorage has been taken in Rossel Lagoon, just within Rossel Passage, with the stone on the northern barrier reef bearing 303° distant 2 miles.

Tidal currents.—In Rossel Passage the tidal currents are fairly strong but set straight through, the flood to the southwestward and ebb to the northeastward.

9–107 Directions.—From a position with the southern end of Yeina Island bearing 271° and Mount Imau (on Tagula) 193° the broad western channel of Rossel Passage will be seen to the northeastward, 1 mile distant. The track recommended is marked on the plan and is as follows:

Approach the western channel, steering 052°, and pass the point of the reef on the western side of the channel entrance at a distance of 800 yards, and then make good a course of 063° for 5 miles to pass between two coral patches, 1,300 yards apart and distinctly visible. When one-half of a mile beyond the southernmost patch, alter course to 091°. This course leads about one-third of a mile southward of a small patch lying about 4 miles from the last turning point and 400 yards southward of another patch lying 3 miles farther. When 1 mile beyond this last patch, steer 098°. This course passes southward of two reefs, nearly awash and close to each other, with a sunken rock situated close southward of the eastern reef. It passes northward of a reef, nearly awash, with two sunken rocks near it, one 400 yards northeastward and the other the same distance westward of it. This course leads one-fourth of a mile northward of a patch which lies 5¾ miles 301° from the sharp and conspicuous hill, 1,140 feet high, within West Point. When this patch is abeam, alter course to 113° for the anchorage in Tryon Bay, passing between Pawsey Reefs and a reef lying 1¼ miles north-northwestward of them.

Caution.—Rossel Lagoon has not yet been completely examined, and a careful lookout from aloft, with the sun in a favorable position, is necessary for safe navigation.

Pocklington Reef (*northeast extremity, 10°45′ S., 155°51′ E., B. A. Chart 2764*).—This coral reef, discovered in 1825, lies about 82 miles east-northeastward of the eastern extremity of Rossel Island. The reef is 18 miles in length in a northeast and southwest direction. The greatest breadth is 3 miles, but in some places it is not more than 1 mile wide. At the northeastern end of the reef

there are some rocks 6 feet high. No anchorage is available off the reef.

Wreck.—The wreck of a large iron vessel above water lies (1880) on the middle of the southeastern side of the reef.

Manuga (Protectorate) Reefs (*11°00′ S., 153°21′ E., H. O. Chart 2956*), the southeastern end of which lies 16 miles north-northeastward of Pana Tinani Island, consist of two separate reefs, awash at low water, extending together nearly 5 miles in a northwest and southeast direction. The reefs are separated by a shallow passage one-half of a mile in width.

The southeastern reef is nearly 3 miles long, narrow, and apparently steep-to. A few black boulders, which just cover at high water, lie on the outer edges of the reef.

The northwestern reef widens towards its western end to a breadth of nearly 1 mile. A sandy islet with some bushes, 20 feet high, lies on the northeastern side of the reef. Half a mile southeastward of the islet is a cay, 2 feet high, with some grass on it.

9–108 **Anchorage.**—Northeastward of the islet a bank extends one-half of a mile from the edge of the reef, and on this bank anchorage has been taken in a depth of 14 fathoms, over coral, with the islet bearing 246°, distant 1,200 yards, and the cay 204°. There is but little protection from the sea, and the edge of the bank is steep, there being upward of 200 fathoms within a short distance.

9–109 **RENARD ISLANDS**, midway between Misima Island and Manuga Reefs, lie 11 miles northwestward of the latter. The islands form a chain 13 miles in length in an east and west direction, and are situated on four separate reefs. The southern side of the chain is steep-to, but on the northern side shallow water extends for a distance of from 2 to 3 miles. The islands are inhabited.

Kimuta (*eastern extremity, 10°51′ S., 153°00′ E., H. O. Chart 2956*), the westernmost and largest island of the group, is 3 miles long, one-fourth of a mile wide, and 275 feet high. The coastline is rocky, but has some sandy beaches. A ridge of hills, grassy at the western end and wooded at the eastern end, extends through the length of the island.

A fringing reef follows the coast line at a distance of from 400 to 800 yards. Bagaium Islet, 30 feet high, lies close southward of the western end of the island and on the fringing reef.

Anchorage in a depth of about 4 fathoms may be obtained by small craft during the southeast monsoon at the head of a bight formed by a horn of the fringing reef on the northern side of Kimuta Island.

Nivabeno Islet, 85 feet high and wooded, lies on the same reef as Kimuta Island and 1¼ miles eastward of the island. Several rocks and islets lie on the reef eastward of the islet, Topuna Islet, 65 feet high, being the easternmost.

Baiwa, Pana Wadai, and Pana Roran Islets comprise a small group of low bushy rocks and islets on a separate reef situated from 1½ to 2½ miles northward of the center of Kimuta Island. From the northern edge of the reef surrounding these islets shallow water curves around toward the eastern extremity of the reef surrounding Kimuta and Nivabeno Islands, and the area has not been examined.

Oreia Islet, 90 feet high and wooded, lies 3½ miles east-southeastward of Nivabeno Islet and near the western end of a reef, 2½ miles in length, on which are two other islets. Between Oreia and Topuna Islet there is a passage 2¼ miles wide and apparently clear, but has strong tide rips across it.

Epoko Islet, the easternmost of the Renard Group, lies 3¾ miles east-southeastward of Oreia. The islet is covered with bushes, 20 feet high, and stands on the northern edge of a reef two-thirds of a mile in length. The southeastern side of this reef is steep-to,

but a bank extends from it in a west-northwesterly direction for 4 miles, with apparently shallow patches on it.

9–110 **MISIMA (ST. AIGNAN) ISLAND,** the eastern extremity of which lies 10½ miles northwestward of the western extremity of Kimuta Island, is mountainous and densely wooded. The island is about 21½ miles in length in an east and west direction, and has a breadth of 5 miles near its eastern end. Except near the southeastern end there is no fringing reef, the coast being steep-to.

Alluvial gold is found in small quantities. Some important lodes, said to contain rich deposits of gold, were discovered in 1905, and are now being worked on a large scale.

9–111 **Aspect.**—The western half of the island is a densely wooded, narrow, lofty ridge, 2,000 to 3,000 feet high. On the northern side the ridge is so abrupt that it hangs over the sea in one tremendous precipice, and on the southern side it is so steep as to entirely preclude cultivation.

Mount Koiatan (Koia–Tau), a rounded peak situated 7 miles eastward of the western extremity of the island, is the summit and has a height of 3,400 feet. The higher peaks of this ridge are frequently cloud-capped during the southeast monsoon.

In the eastern half of the island there is an extensive valley opening into a bay on the southern coast. The valley is formed by the central ridge dividing near the middle of the island and branching off to the northern and southern coasts. The southern branch terminates in a promontory situated 7 miles westward of the eastern extremity of the island. The northern branch, gradually decreasing in altitude, follows the coast as far as the northern extremity of the island, where it turns abruptly to the southward and rises in a series of conspicuous hills, 1,000 to 1,435 feet high.

Inhabitants.—The population of the island in 1923 was 23 whites and 1,500 natives. The language of the natives bears little or no resemblance to that of the adjacent islands. There is a government station and native missionary teachers. There are a large number of villages, some of which are large; the greater number are on the northern side of the island.

9–112 **Northern coast of Misima Island.**—**Cape Henry** (*10°40′ S., 152°53′ E., H. O. Chart 2956*) is the eastern extremity of the island. From the cape a line of cliffs, 100 to 200 feet high, trends 6½ miles northwestward to Rokia Point, the northern extremity of the island. This bold shore is broken by two sandy beaches, separated by a point. Rokia is a low point, but the cliffs begin immediately southeastward of it.

Between Rokia Point and Cape Ebola, 16 miles westward, the coast is rocky in places, with stretches of sandy beach. The coast has not been examined, but in view of the steepness of the mountains and depths of from 300 to 400 fathoms within a mile of the coast, it is improbable that there is any anchorage, except in Rijak (Treachery) Bay, 1¼ miles southwestward of Rokia Point.

9–113 **Southern coast of Misima Island.**—**Cape Ebola,** the western extremity of the island, is a sharp, rocky point with a rock awash a few yards off the point, but otherwise steep-to, 235 fathoms being obtained within one-half of a mile of it. Eastward from the cape the land rises rapidly to an elevation of 2,500 feet.

Anchorage.—It is reported that anchorage may be obtained in a bight about 1 mile east-southeastward of Cape Ebola.

9–114 **Coast.**—From Cape Ebola a rocky coast trends east-southeastward for a distance of 7 miles to Baggabagga, a steep cliffy point. Eastward of this point a bay indents the coast to a distance of about ¼ mile and a cove and large village lie 2¾ miles eastward of the same point. About 5½ miles eastward of the cove is a pro-

montory, which forms the southern extremity of the island.

About 6 miles east-northeastward of the southern point of the island there is a low cliffy point, eastward of which the mangrove-lined coast forms an inlet, named Bugoiya Harbor. The eastern side of this inlet is formed by a reef which extends about 1 mile offshore as far as Cape Henry. The southeastern extremity of this fringing reef is marked by Managun Islet, tree-covered and 90 feet high, lying three-fourths of a mile southeastward of Cape Henry. Half a mile westward of Managun and on the southern edge of the same reef is Gigira Islet, 60 feet high.

9–115 Bugoiya (Bwagaoia) Harbor, the entrance to which is well-defined and marked by a beacon on either side, is a narrow inlet about 1 mile long, and has depths varying from 16 fathoms at the entrance to 2 fathoms near the head. There is a small wharf on the western side of the harbor. The western edge of the reef on the eastern side of the harbor, abreast the wharf, is marked by concrete posts standing about 100 yards apart. There is a railroad to the mines, and steamers call at the harbor occasionally.

Anchorage.—It is reported that small craft with local knowledge may obtain anchorage in the harbor. It is advisable to have a stern-fast to one of the trees on the western side of the harbor and to lie with the bow to the southward.

9–116 DEBOYNE ISLANDS (*H. O. Charts 5914 and 5983*), lying southwestward of Misima Island, are situated on a broken barrier reef and in the center of the lagoon formed by the barrier reef.

Panniet (Panaete), (Deboyne) Island (*northern extremity, 10°40′ S., 152°22′ E., H. O. Chart 5914*), the largest and northernmost of the group, lies with its northern extremity 8¾ miles west-southwestward of the western extremity of Misima Island. The island is crescent-shaped and has a single conical peak, 725 feet high, near its western side.

The northern coast is bold, steep, and about 100 feet high, gradually decreasing to 20 or 30 feet at the southern extremities. On the southern coast the cliffs are lower and more broken. The island is thickly wooded, but near the summit and on some of the slopes there are large clearings.

The community of Panniet is the largest in the Louisiade Archipelago, and is a great canoe-building center. The principal villages are on the southern coast, which is shoal to approach and dries in sand flats for some distance offshore.

Barrier reef.—A thin tongue of coral extends for 6 miles in a southwesterly direction from the southwestern horn of Panniet Island, and reaching to West Passage, it forms the northwestern barrier of the lagoon. A beacon, painted white, is located on the reef close to the southwest extremity of Panniet Island. From the southeastern horn a reef extends 9½ miles southeastward, and on it there are several wooded islets and sand cays. Through the barrier there are four openings, but the two northernmost of these, at ¾ and 2½ miles from Panniet Island, are not navigable, as they open into shallow water and foul ground.

From West Passage the barrier reef, through which there are three openings, extends in an easterly direction for a distance of over 12 miles, where it is separated by South Passage from the reef extending southeastward from Panniet Island. These three sections of the barrier reef enclose Deboyne Lagoon.

9–117 Islets on barrier reef and passages into Deboyne Lagoon.—Panauya Wana Islet (*10°44′ S., 152°25′ E., H. O. Charts 5914 and 5983*) lies on a reef which extends 1,200 yards southeastward from the southeastern extremity of Panniet Island. A beacon, painted white, is located about 2¼ miles south-southwestward of Panauya Wana Islet.

Passage Islet, 40 feet high, lies nearly 6

miles southeastward of Panauya Wana, and on the northern edge of a reef one mile in length. Immediately northward of Passage Islet there is a passage through the barrier; it is 400 yards wide, with a depth of 5½ fathoms. A small 3-fathom patch lies in the center of this channel. The edges of the reefs on either side of the passage are irregular, and the tidal currents flow through with velocities up to 4 knots. A beacon, painted white, is located on the north extremity of Passage Islet.

Rara Island, 85 feet high and wooded, is situated on the northwestern angle of a reef lying 1½ miles southward of Passage Islet. There are also several other islets and rocks on this triangular reef, which forms the southeast extremity of Deboyne Lagoon. A beacon, painted white, is located on the northwest extremity of Rara Islet.

Redlick Passage lies between the northwestern end of Rara Islet and the southern end of Passage Islet reef. The passage is about ¾ mile wide. A 6-foot rock shoal and a 2½-fathom shoal lie within ½ mile north-northwestward of the northwest end of Rara Island. There is a least depth of 19-feet in the north part of the passage. The reef on the north side of the passage is plainly visible.

The tidal streams in Redlick Passage run at a considerable rate but the channel is easily navigated.

9–118 South Passage lies between the eastern end (marked by a sand cay) of the reef forming the southern boundary of Deboyne Lagoon and the southern extremity of the triangular reef on which Rara Islet lies. The passage is about ¾ mile in width with general depths of 16 fathoms and upwards. A small 6-fathom shoal lies in the center of the passage. A beacon, painted white, marks the west side of South Passage, and a beacon, painted red, is located on the reef about 1½ miles further westward.

South Passage is navigable for large vessels, but due to its crooked shape and strong currents, it is recommended only for emergency use. For ordinary circumstances West Passage is recommended for all vessels entering and leaving Deboyne Lagoon.

Maximum observed current in South Passage was 4 knots in 1943, with the current setting along the axis of the channels of the passage. Change in direction of the current is variable and appears to bear no relation to times of high and low tides.

9–119 Nibub Islet (*10°51′ S., 152°26′ E., H. O. Chart 2956*), 30 feet high, lies 3½ miles southwestward of Rara Islet and on the western end of a part of the southern barrier reef which extends westward from South Passage. Immediately westward of the islet there is a passage, which is 400 yards wide and has a depth of 3½ to 8 fathoms. A beacon, painted white, is located on the islet.

Passages.—There are two other passages, 1,200 yards apart, through the southern barrier reef. The easternmost, situated 3 miles westward of Nibub Islet, is 900 yards wide, but a spit with a depth of 1½ to 3 fathoms extends to the middle of the passage from the reef on the western side. Sunken rocks lie one-fourth of a mile northward of the spit. A red beacon marks the east side of the passage.

The westernmost of these two passages is 800 yards wide, between the western reef and the spit which extends about 300 yards from the eastern reef, and has a depth 16 fathoms in the middle. This passage is not recommended due to considerable foul ground northward of the passage.

9–120 West Passage—Directions.—West Passage, 9 miles westward of Nibub Islet, is the recommended entrance to Deboyne Lagoon. It is wide and unobstructed, with deep water close up to the reefs. A least depth of 9 fathoms is reported.

Vessels may enter Deboyne lagoon from either eastward or westward. Subject to the usual precautions, the lagoon and the entrance of it, through either Redlick or West Passage, presents no difficulties; both are well defined and Redlick Passage, though narrow may be taken with care.

Currents.—A northerly set of up to 4 knots has been reported in the north approach between the Torlesse Islets and the lagoon.

A strong tide rip sometimes sets across the axis of West Passage at the seaward limits of the reef, but is clearly visible to the eye and is not hazardous due to the width of the entrance. The rip was observed to set to the southward during ebb tide and to the northward during flood tide.

Vessels have only to steer a midchannel course between the reefs to enter Deboyne Lagoon.

9–121 **Deboyne Lagoon** (*H. O. Chart 5914*), which is triangular in shape, has depths of from 1¼ to 7 fathoms in the northern part, but as there may be other shoals than those charted, caution is necessary when seeking anchorage. Eastward and northeastward of Panapompom Island the depths are very irregular, and there are some sunken rocks. A 1½-fathom patch marked by a **beacon**, lies on the northeast side of the southeast anchorage area. In the southeastern part of the lagoon there are regular depths of from 14 to 18 fathoms. The western part of the lagoon has regular depths of 10 to 18 fathoms.

The village on the south shore of Panniet Island may be approached to within about 100 yards by ship's boats, and passengers landed by native canoes. Fruit and vegetables may be obtained.

9–122 **Panapompom Island,** wooded and 514 feet high, lies with its northern point about 2 miles southward of the southeastern extremity of Panniet Island and nearly in the middle of the lagoon. There is a village in a small bay on the northeastern side of the island, and behind this village a cultivated valley extends to the foot of the hills.

The island is joined to Panniet Island by foul ground, and it is completely surrounded by reefs and shoals. Between the island's western point and the lagoon's western fringing reef are numerous submerged rocks and dangers, for position of which refer to the chart.

A white **beacon** stands on the northeastern point, and a similar **beacon** on the southeastern point.

9–123 **Nivani Island,** situated about one-half of a mile southward of Panapompom Island, is small, grassy, partly wooded, and 310 feet high. The channel separating the islands is shallow. Reefs and foul ground extend as far as 400 yards off the southern and western sides of the island, and a 4½-fathom patch lies about one-half of a mile southward of the eastern end of the island.

A white **beacon** stands on the eastern point and a similar **beacon** on the western point of the island.

Anchorages.—Anchorage can be obtained in the southwestern and southeastern parts of Deboyne Lagoon. In 1943 many anchorage berths were established in each of these parts, which were wire-dragged to a depth of 40 feet and have general depths of 13 to 20 fathoms.

Good anchorage bearings are afforded by the numerous beacons erected on the islands and on the barrier reef, by the tangents of Panapompom and Nivani Islands, and by the peak of the 725-foot hill on Panniet Island.

Currents in the vicinity of Panapompom and Nivani Islands are negligible, but gradually increase to the eastward and to the westward. At a point just inside West Passage, maximum current observed was 1 knot, setting northwest on the ebb and northeast on the flood. Maximum current observed in the eastern portion of the anchorage was 1.4 knots, ebb setting easterly and flood setting westerly. Slack water occurs about midtide.

9–124 **Off-lying islets.—Redlick Islets** (*10°50′ S., 152°33′ E., H. O. Chart 2956*) comprise a chain of bushy, low islets, situated on the northern edge of a reef which is separated from the southeast part of Deboyne Lagoon by South Passage, a deep channel about ½ mile wide. This large reef, the edges of which are steep-to, has a deep lagoon inside of it, but there is no entrance. Three and one-half miles southeastward of Redlick Islets and on the eastern edge of the same reef, there is an islet 40 feet high.

Mabui Islet, 90 feet high to the top of the trees, stands on the northeastern side

of a reef situated between the southeastern end of Redlick Islets Reef and the northwestern side of the barrier reef on the northern side of the Calvados Chain. There is a deep channel on either side of this reef.

Torlesse Islets are a group of low and wooded islets, the easternmost of which lies 9 miles southwestward of Panniet Island. The three principal islets, Pana Niu, 100 feet high, Bonnabonnawan, and Tinolan, lie on the northern side of the reef, which is 4 miles in length in an east and west direction. There are several rocks on the southeastern and eastern sides of this reef. The center of a bank, with a least known depth of 55 fathoms, lies about 3½ miles westward of Pana Niu.

9–125 **UNSURVEYED AREA OF LOUISIADE ARCHIPELAGO.**—A large portion of the western part of the Louisiade Archipelago has not been surveyed. Trading vessels pass to and fro on certain well-known tracks through this area which is about 70 miles in length and width, and the following islands and surrounding dangers are known to exist.

9–126 Conflict Group *(center, 10°45'S., 151°45'E.)*, situated about 13½ miles westward of Torlesse Islets, is a group of atoll islands, covering an area about 18 miles in length in an east and west direction and 5 miles in width. Excluding the very small islands, there are about 20 in number.

Nearly all the islands are situated on the northern side of the atoll, there being but three on the southern side. The largest islands are apparently at the extremities, Irai and Panasesa being at the western and Auriroa and Muniara at the eastern. Panarakiim Ginara, Panaboal, and Tabulagoal are the largest on the northern side. Quesal and Itamarina are the two islands in the lagoon, the latter being situated on a reef about 2 miles in diameter.

There are many passages, some of them deep, leading between the islands into the lagoon, where apparently there is anchorage in depths of 15 fathoms and less. Between Panasesa and Gabugabutan Tubie there is a depth of 21 fathoms in the middle of the passage. Vessels usually enter the lagoon by Ship Pass, southeastward of Irai. This pass may be entered with Itamarina Island bearing 046°; thence, a passage for vessels of 10-foot draft leads in an easterly direction through the lagoon.

A clear passage lies between the Conflict Group and Emerald Reef.

Conflict Group is reported to lie 2¾ miles farther southeastward than charted on H. O. Chart 2950.

Emerald Reef lies northwestward of the west end of the Conflict Group. A depth of 7 fathoms was obtained 6¾ miles northwestward of Panasesa Island (Conflict Group) in what appeared to be the bight of the reef. From this position one portion of the reef was found to extend 4 miles northwestward, and the other in a southeasterly direction for probably a much greater distance. Numerous tide rips prevented the limits of the reef from being clearly ascertained, but just westward of the 7-fathom spot the reef appeared to be nearly awash.

A ridge with but little water over it extends 2 miles westward from the northwestern end of Emerald Reef, and is probably part of the same reef. A coral patch with a depth of 7 fathoms lies 9 miles northward of the same end of Emerald Reef.

Lunn Island lies about 5 miles eastward of the east end of the Conflict Group. It is 80 feet high and is fringed by a reef. A light is shown from the east end of the island.

9–127 **Bunora and Sarupai Islets.**—Bunora Islet is located about 14¾ miles north-northwestward of the eastern end of Conflict Group. Sarupai Islet lies 4 miles westward of Bunora. These islets were reported to lie about 2 miles southward of their charted positions.

A coral shoal, the position of which is

approximate, is charted 10 miles west-northwestward of Sarupai Islet.

The passage between Bunora and Sarupai Islets is not recommended for deep-draft vessels due to the fact that in places the bottom suddenly shoals off to 33 fathoms, indicating the possible existence of undetected dangers in this vicinity.

Passage southward of Conflict Group.—The waters both eastward and southward of Conflict Group are navigable. The passage southward of the group as shown on the chart is habitually used by vessels trading with the Louisiade Archipelago. Directions for making the passage eastward of Conflict Group are given in section 9–11.

9–128 **Bonvouloir Islands.—East (Waremata)** Island *(10°24′ S., 152°07′ E.)*, the easternmost of the group, lies 26 miles north-northeastward of the eastern end of Conflict Group. The island is inhabited, densely wooded, and about 650 feet high. The eastern side of the island is bold, but the northwestern and western sides are lower. There are great depths off the northern side of the island at a distance of from one-half to three-fourths of a mile.

East Island was reported (1963) to lie about 1 mile north-northwest of its charted position.

Discolored water with probable depths of from 18 to 20 fathoms extends off the eastern end of the island.

A charted 97-fathom bank, about 1 mile long, is located about 2 miles northeastward of East Island.

Anchorage in 17 fathoms, broken coral and sand, may be obtained about one-fourth of a mile from the northwestern side of the island.

Reefs.—Reefs and shoals, some marked by breakers, lie within 7 miles westward of East Island. The westernmost of these dangers is a 3-fathom patch.

Hastings Island, lying 13 miles west-northwestward of East Island, is about 730 feet high, bold, and densely wooded. A bank about three-fourths of a mile in length lies off the northwestern point of the island, and discolored water has been observed off the eastern end.

Light.—A light is shown from the southwestern extremity of Hastings Island.

9–129 **Strathord Islands,** a group of islands connected by a reef, lie 4 miles northward of Hastings Island.

According to the latest information in 1943, the southern end of Strathord Islands is located in latitude 10°16′00″ S., longitude 151°51′20″ E.

The passage between this group and Hastings Island appears to be clear of dangers.

Light.—A light is shown from the northern extremity of the Strathord Islands.

Passages.—Safe deep-water routes are found either to eastward or westward of the Bonvouloir Islands. Good landmarks are the islands of the group, as well as Sarupai and Bunora Islets. The chain of reefs and shoals extending westward from East Island must be avoided. These reefs are usually plainly seen and they are at times marked by breakers. The area immediately to the northward of the chain of reefs and shoals is unsounded, and should be avoided, as undetected dangers may exist.

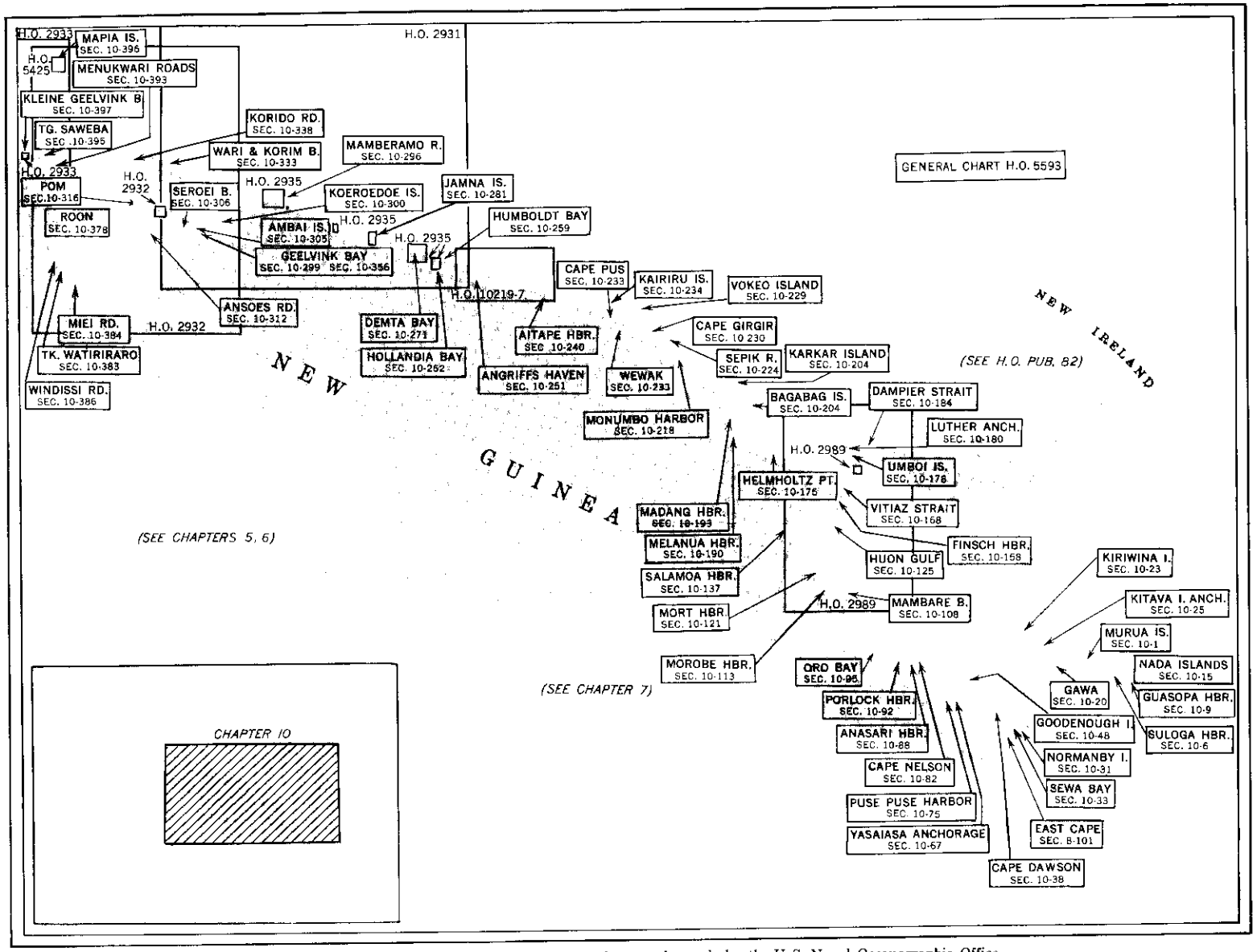

Chart limits shown are of the best scale charts issued to naval vessels by the U. S. Naval Oceanographic Office.
Section numbers refer to the place in the text where a description of the designated locality begins.

CHAPTER 10—GRAPHIC INDEX

CHAPTER 10

ISLANDS NORTHWARD OF THE LOUISIADES—NORTHERN COAST OF NEW GUINEA FROM EAST CAPE TO CAPE OF GOOD HOPE

10–1 MURUA (WOODLARK) ISLAND *(9°10′S., 152°48′E.)* situated about 80 miles northward of Misima Island of the Louisiade Archipelago, is about 40 miles in length in an east and west direction, and about 16 miles in breadth. There is some high land in the western half of the island, but the eastern half is low. Suloga Peak, 1,345 feet high and conspicuous from the southward, lies about 1½ miles northward of Suloga Point, the southwestern extremity of the island. Mount Kabati is situated near the middle of the northern side of the island. The coast is generally high and densely wooded to the edge of the water, and in some parts it consists of vertical limestone cliffs. While the northeastern side of the island is relatively steep-to, the southern and southwestern sides are encumbered with reefs and and detached islets lying offshore up to a distance of 15 miles. The principal anchorages are on the southern side of the island. Bonagai, at Kwarapan Bay, on the western coast of the island is a Papuan port of entry.

10–2 Inhabitants.—The natives are of the Melanesian type, with an admixture of Papuan blood, and are of small stature. A small number of Caucasians also live on the island.

Supplies.—Small supplies of yams, pumpkins, and pigs are obtainable in some of the villages. Fresh water of good quality is obtainable on the shores of most of the small bays.

Trade.—Copra and gold are exported.

10–3 Kwarapan (Kwaiapan) Bay, the entrance to which lies about 9 miles northwestward of Suloga Point, should not be approached by vessels with a draft of more than 12 feet. Vessels usually anchor 100 yards from the shore at Bwoi Bwoi to land cargo; which is later shifted to Bukanai, about 3 miles distant. At Bukanai there is a small jetty with a depth of 4 feet at high water. Between the anchorage and the jetty the water is shallow, mud bottom.

10–4 Approach to Kwarapan Bay by way of West Entrance—Directions.—West Entrance through a barrier reef (sec. 10–17) and is located about 16 miles west-northwestward of Suloga Point. It is about 1¼ miles southward of the largest island in its vicinity and is navigable by moderate-sized vessels. The passage inside is moderately difficult owing to shoals, but it is reported that overseas vessels habitually make the anchorage with the aid of beacons.

Note.—The following directions, with the exception of the last paragraph, are from Sailing Directions for the Northeast New Guinea area, a Dutch publication.

Approaching West Entrance from seaward, bearings of Sharp Island and Entrance Island give sufficiently accurate positions to clear the reefs lying between them. Entrance Island is easily recognized, as the scrub at its southern end is higher than the rest, while on Dilokwoi and the other islands it is uniform in height.

When the middle of Entrance Island bears 038°, bring it ahead on that course, until the beacon on the southern side of the channel bears 090°. Then alter course slowly to starboard, until an inside beacon (also on

the southern side of the channel) bears 104°. Bring this inside beacon to bear close on the starboard bow, keeping the vessel in midchannel until the outside beacon bears 257°. Bring this beacon astern 257°, until the inside beacon bears 244°. Then steer 064° to a position 300 yards northwestward of Middle Reef, about 7½ miles distant. Middle Reef carries a white triangular beacon.

From this position steer 056°. A conspicuous bushy tree on the high ridge behind Nelson Point should be just open of the point. Follow this course for 2½ miles. Kabati Hill, conical in shape, in range 075° with a red triangular beacon, will indicate the next turning point from which to steer 068°; which course brings the red beacon 1¾ miles distant close on the starboard bow, and open to the left of Kabati Hill. The channel, 9 fathoms deep, between the reef and shoal marked by an iron rail with drum top mark, is very narnow, but the reef is steep-to. From the red beacon abeam stand on 1 mile.

Two beacons, marking shoal water on the starboard hand of Nelson Point channel, will be seen slightly on the port bow. When these two beacons come in range, haul to port, to pass parallel to the line of these two beacons about 200 yards distant. This is to clear a shoal, unmarked, extending from Nelson Point.

Another beacon, marking shoal water, will be seen on the port bow. Pass midway between this beacon, and the second of the two starboard beacons mentioned. The vessel is then entering the anchorage and may anchor about 600 yards from the beacon in 10 fathoms. Good anchorage can be obtained closer to the landing beach if desired, in 6, 7, or 8 fathoms.

Beyond the anchorage there is a tortuous beaconed passage by which small vessels enter Kwara pan Bay. Black square beacons are passed close-to on the port hand entering; red triangular beacons on the starboard hand. This passage is used by vessels up to 110 feet in length, 22 feet beam, and 10 feet draft. In places it is very narrow, and has one very sharp turn.

10–5 Kulamadu, 2 miles inland from Kwarapan Bay, is the only settlement on the island, and is unhealthy. The population consists of about 40 whites and 2,500 natives. There is a government station and a customhouse. Tbe customs officer has power to grant pratique for Murua Island only. Mail steamers call every two months.

10–6 Suloga Harbor, situated immediately eastward of the southernmost point of Murua Island, lies at the mouth of an inlet extending about 2 miles in a north-northwesterly direction. The harbor is fronted by Mapas Island, and is well sheltered. There are general depths of from 8 to 11 fathoms in the harbor, which is about 1 mile in extent.

The passage into the harbor is 550 yards wide between Whasela Point and a reef, which does not always break, extending 800 yards eastward from the northern point of Mapas Island. The partly awash coastal reef of Murua Island lies 1,600 yards eastward of Mapas Island; and the seaward approach to the harbor lies between this reef and the fringing reef of Mapas Island. The channel is about 1,300 yards wide and has a fairway depth of 13 fathoms.

10–7 Mapas Island (*9°12′ S.,152°49′ E.*), the coast is lined with mangroves, is crescent shaped and about 200 feet high. There is a village situated on the sandy beach on the southwestern side of the island, and some of the natives speak English.

Reefs extend about 500 yards northward from the northwestern point of the island, and there are two detached patches between the extremity of these reefs and the northern point of the island.

An area of discolored water, presumably shoal, was reported as lying about one-third

of a mile southward of Mapas Island.

Whasela Point, situated 1,300 yards east-northeastward of the northern point of Mapas Island, consists of two wooded small islets separated by foul ground from the mainland.

Steep Point, 200 yards westward of Whasela Point, has some huts which are conspicuous when approaching from seaward.

10–8 **Anchorage—Directions.**—From the southward, Suloga Peak is conspicuous; and on approaching the harbor, Mapas Island can be made out. Make good a course of 021° through the middle of the channel between the fringing reefs of Mapas and Murua Islands. The edges of the reefs are clearly defined, but the detached reef lying 800 yards eastward of the northern point of Mapas Island is not easily made out, and does not break in fine weather.

When Oquana Point, the northern point of Mapas Island, bears 280°, gradually alter course to 285°; and anchor when Shoute Point, the eastern entrance point of the islet, bears 333°, distant one-half of a mile. This anchorage lies 450 yards eastward of a detached reef situated in the center of the harbor. Small vessels may obtain anchorage southeastward of this reef, with Oquana Point bearing 100°, distant 600 yards.

Vessels proceeding into the inlet, which has depths of from 6 to 7 fathoms in its outer part, should be careful to avoid two 1-fathom patches lying just inside the entrance, by passing westward of them.

Sheltered anchorage has also been obtained in 13 fathoms outside the harbor, in the channel between the fringing reefs to the eastward of Mapas Island.

10–9 **Guasopa Harbor** *(9°16′S., 152°56′E.)* is situated in a bight between Main Point, the southeastern extremity of Murua Island, and a point on the coast about 4 miles to the westward. The barrier reef extends about 9 miles west-southwestward from Main Point and protects the harbor. Reu, Vava ai (Vavai), and Aiun (Aiona) are densely wooded coral islets on the barrier reef and lie 1¼ and 3½ miles westward and 8 miles west-southwestward, respectively, of Main Point. The three islets have a similar appearance and their respective heights to the tree tops are 130, 121, and 120 feet.

The main entrance of two entrances is to the westward of Vava ai Islet. The passage rounds the western extremity of that islet between a portion of the barrier reef extending about ½ mile southwestward from the islet and a 3-fathom patch over which the sea breaks. This patch is the easternmost of a series of patches on the barrier reef to the westward. There are depths of 11 to 14 fathoms in the entrance and general depths of 8 to 12 fathoms inside the entrance that gradually decrease to 5 fathoms towards Guasopa, a village about 3½ miles northeastward of Vava ai Islet. A 10-foot shoal lies in the fairway about 1 mile northeastward of Vava ai Islet, and a 28-foot patch lies about ½ mile further northeastward. Iris Patch with a depth of 2½ fathoms lies on the western side of the fairway about ¾ mile west-northwestward of the western extremity of Vava ai Islet. The shoals in the fairway and those bordering it were reported to be buoyed (1952).

The harbor shoaling gradually toward the head, where Guasopa village is located, contains numerous patches of foul ground and pinnacles. Vessels should anchor at least 1½ miles from shore to be safe. Cargo is discharged by barge from vessels at anchor. It is reported that there is room for about five vessels in the harbor, coral bottom. A landing facility, available for small craft, is located on the northeastern side of the harbor.

The eastern entrance lies between Vavi ai and Reu Reefs, and is reported to be intricate with numerous shoal spots.

This entrance is used by island vessels drawing 9 feet, as local knowledge is required for this entrance channel.

Except for the western or main entrance, the surrounding waters are incompletely surveyed, uncharated shoals and reefs are known to exist.

10–10 Anchorage.—Anchorage in a depth of from 9 to 10 fathoms has been taken in Guasopa harbor; with the eastern end of Vavi ai Islet bearing 189°, 800 yards off.

Signal station.—A signal station stands on the shore at the head of the bay.

Reefs.—There are some uncharted reefs off Aiona Islet and eastward of it. A vessel steering a 098° course, from abreast Aiona Islet toward Nubara Islet, reported that she crossed patches of sunken reef, one with a depth of 3½ fathoms. A 6-fathom patch lies about 3 miles south-southwestward of Aiona Islet.

Tides.—The high-water interval at full and change at Guasopa Harbor is 7h. 15m.; springs rise 4 feet.

10–11 Directions.—The entrances will be identified by the islets mentioned. The eastern peak of the continuous high land of Murua Island, bearing 313°, is said to lead up to the western entrance. To enter by it, steer to pass between the rocky ledge which extends from the southwest extremity of the reef surrounding Vavi ai Islet, and the shoal patch lying to the southwestward; keeping the reef at a distance of 200 yards, rounding its northwestern angle at the same distance, avoiding Iris Patch. Caution is necessary in entering this harbor.

10–12 Kumarau Bay, to the northward of Main Point, indents the coast about 3½ miles in a northwesterly direction. About 2 miles wide at its entrance, the bay shoals considerably toward its head. Rivers discharge into the bay at its head and western end.

From the northern entrance point of Kumarau Bay, about 3¾ miles north-northeastward of Main Point, the coast trends northward and eastward for about 3¾ miles to Direction Point, the eastern extremity of Murua Island. A reef appears to extend about 1 mile offshore along this coast which is unsurveyed.

Buyuesi (Richards) Bay *(9°08′S., 152°53′E.)*, located on the northern side of Murua Island, affords anchorage for small vessels with local knowledge, in a depth of 10 fathoms about 60 yards from the shore. This anchorage is open and would be unsafe during the northwest monsoon. There is a village in the western corner of the bay.

About 5 miles northwestward of Buyuesi Bay is a bay which opens into a shallow lagoon, one-fourth of a mile in extent. Outside the reef in this bay a depth of 10 fathoms, coral, was obtained at distance of one-fourth of a mile from the shore, and this would probably be a better temporary anchorage than Buyuesi Bay.

10–13 Madau Island—Boagis Bay—Anchorage.—At the southern end of Madau Island, an island about 10 miles northward of West Entrance, and off the northwestern end of Murua, is Boagis Bay; a large bay formed by the long spit which runs in a westerly direction, north of the channel between Madau and Nusam Islands. Depths of 8 fathoms are found one-half to 1 mile off the shore of the bay. Anchorage is good in the southeast monsoon season, but dangerous in the northwest monsoon season.

Waspimat Bay.—Anchorage can be found in about 20 fathoms, one-half to 1 mile offshore, in the bay which is situated in the center of the north coast of Murua Island.

(6041) SOUTH PACIFIC OCEAN—Solomon Sea—Laughlan Islands—Depth reported.—A depth of 4 fathoms has been reported (1966) about 4.0 miles **000°20′ from** Cannac Island (9°15′ S., 153°27′ E. approx.).

(N.M. 44/66.)

(N.M. 36(353), Sydney, 1966.)
H.O. Chart **5593.**
H.O. Pub. 73, 1952, page **371.**

This bay, with the small bay northwestward of Buyuesi Bay, was used by sailing ships bringing miners and their gear; and it affords temporary anchorage during the southeast monsoon only. In the northwest monsoon they are completely exposed.

SHOAL.—A shoal, with a depth of 6 feet, extends from 3/4 mile to 1 1/4 miles from the northernmost point of Murua Island.

This shoal seldom breaks, but is usually marked by heavy tide rips and overfalls.

CAUTION.—As the coast in this vicinity is unsurveyed, it should not be approached within a distance of 2 miles.

10-14 ISLANDS AND DANGERS EASTWARD OF MURUA ISLAND.—Nubara Islet (9° 13′ S., 153° 07′ E.), about 8 miles east-northeastward of the southeastern extremity of the island, lies about 1 mile west of the end of a reef extending east-southeast from Direction Point. Two small islets lie on this reef about 2 1/2 miles south-southeast of Direction Point.

DANGERS.—About 9 miles eastward from the eastern extremity of Murua is a reef above water, the extent of which is not known; and about 6 miles east-southeastward of Nubara Islet is a shoal, about three-fourths of a mile in extent, on which a depth of 6 fathoms was obtained. The northern side of Murua is steep-to, but the southern and southwestern sides are strewed with islets and detached reefs to a distance of 20 miles.

CANNAC ISLET (9°15′ S., 153°31′ E.), about 116 feet high, lies about 24 miles eastward of Nubara Islet. The island has been reported to give good radar returns up to 25 miles. A shoal area with a least charted depth of 10 fathoms lies within a radius of about 5 1/2 miles, southeastward to southwestward, of Cannac Islet. Foul ground extends about 4 miles southward from the Islet.

Between Cannac and Nubara Islets, an extensive coral bank exists, soundings of from 13 to 25 fathoms having been obtained over an area extending from 5 to 10 miles westward of the former islet.

Anchorage in a depth of 4 fathoms may be obtained 400 yards westward of the islet.

10-15 LAUGHLAN (NADA) ISLANDS consist of eight islets lying on a horseshoe-shaped reef with the base of the horseshoe about 9 miles eastward of Cannac Islet. The islets, not more than 9 feet high, are composed of sand and coral and are covered with coconut trees, about 80 feet high. The islands have been reported to give good radar returns. The atoll forms a lagoon which is open to the westward and has a maximum diameter of 3 miles. There are several villages and the natives are very friendly. A shoal depth of 9 fathoms has been reported (1964) to lie about 21 miles east of the north extremity of the northernmost islet of the atoll.

Shoal water, which breaks over a distance of 3 miles in a northeasterly-southwesterly direction, has been reported northeastward of the Laughlan Islands between the approximate positions: 9° 02′ S., 154° 07′ E. and 9° 04′ S., 154° 05′ E.

Anchorage has been taken in the southern portion of the lagoon, the depths varying from 10 to 12 fathoms. The best entrance is northward of a small sandbank with bushes on it. The water in the lagoon is clear, rendering the numerous coral patches easy to distinguish.

There is an anchorage outside the entrance which can be used in the southeast monsoon, but it is reported to be poor holding ground.

CURRENT.—A current was observed to be setting westward, with a velocity of 2 knots, between Rossel and Laughlan Islands. From this position it was observed to set north-northwestward for 170 miles. The current decreased in velocity along this track to one-fourth of a knot. Then, from the latter point, a westerly current was reported to be setting toward Finsch Harbor.

CAUTION.—Because of the above-mentioned currents, Laughlan Islands should be given a berth of at least 2 miles.

10-16 ISLANDS SOUTHWARD AND WESTWARD OF MURUA ISLAND.—Alcester Islands (9° 34′ S., 152° 27′ E.), two in number, are charted about 25 miles southwestward of Suloga Point on Murua Island. The western island is elongated in an east and west direction, flat-topped, densely wooded, and 180 feet high at the eastern end. Cliffs rise perpendicularly from the water on the northwestern side of the island, and a cove with a village lies in the middle of the northern side.

The eastern island, 100 feet high to the tops of the trees, is considerably smaller than the western island, and lies close off its eastern extremity.

The islands have no fringing reef, but a reef is shown on the plan, to extend 700 yards southwestward from the western extremity of the western island.

Anchorage during the southeast monsoon may be obtained off the village lying on the northern side of the western island, but is exposed to swell.

10–17 Ginetu Island is situated about 15 miles south-southwestward of Suloga Point, the southwestern extremity of Murua Island. It is wooded, about 60 feet high to the top of the trees, and bordered by extensive reefs. An islet with a treetop height of 45 feet lies about ¾ mile southeastward of Ginetu Island near the extremity of a long reef connecting it with that island. Ginetu Island, being situated in the approach to Suloga Harbor, caution is necessary when in its vicinity.

Barrier reef.—A broken barrier reef, about 20 miles long with several islets on it, extends from a position about 7 miles northwestward of Ginetu Island to the southwestern extremity of Madau Island (sec. 10–13) and fronts the western side of Murua Island. A detached reef lies about 12 miles northwestward of Ginetu Island and 15 miles west-southwestward of Suloga Point.

West Entrance, the main entrance through the barrier reef and an approach to Kwarapan Bay, has been described in section 10–4. A second entrance is charted about 13 miles west-southwestward of Suloga Point.

10–18 Sharp Island *(9°16′ S., 152°33′ E.)*, situated about 11 miles westward of Suloga Point, is about 2 miles inside the barrier reef. An islet lies about 2½ miles south-southwestward of Sharp Island, and an islet and reef lie about 1¼ miles to the southeastward. Anchorage may be taken about ½ mile southeastward of Sharp Island close outside foul ground extending from the island.

10–19 Egum Atoll.—Egum Atoll, with its center about 48 miles west-southwestward of Suloga Point, has a circular reef about 14 miles in diameter. It comprises a group of 14 islets, chiefly of a basaltic nature, which are located on the northern edge of the reef and in the lagoon formed by the reef. A large part of the reef has depths of 4 to 7 fathoms but it rises a few feet above water on the northern edge where the islets are located.

Yanaba is the northwesternmost and largest of the islets. There are some villages on a sandy bay on the southern side of the islet. The tree tops on Yanaba are about 155 feet high at its eastern end rising to about 212 feet high at its western end. Egum, an islet in the middle of the lagoon, is well cultivated and has fresh water. A small islet with trees lies 3½ miles northward of Yanaba.

The lagoon is best entered by its northeastern and northwestern entrances. The northeastern entrance is reported to be ¾ mile wide, with depths from 5 to 6 fathoms on its northwestern side. The northwestern entrance, which is southwestward of Yanaba, has a depth of 4 fathoms in places.

Anchorages.—There is said to be sheltered anchorage in the center of the group, probably near Egum Islet, but that off the Yanaba villages, in a depth of 6 fathoms, is open to southeasterly winds.

Marshall Bennet Islands, consisting of Gawa, Kwaiawata, Dugumenu, and Iwa, lie from about 25 miles westward, to nearly 40 miles northwestward of the western extremity of Murua Island.

10–20 **Gawa** *(8°59′ S., 151°59′ E.)*, the easternmost island of the group, is a former atoll elevated above the sea. The coral sides of the island rise to a height of 572 feet; and the plateau, which was the lagoon, is 100 feet below the circumferential rim of the island. Coconut trees

mark each village, and the natives are friendly.

Anchorages.—During the southeast monsoon, good anchorage in depths of from 6 to 7 fathoms may be obtained 400 yards off the western side of the island.

Anchorage in a depth of 31 fathoms has been taken off the northwestern side of the island, with Siumgwai Point, the northern point of the island, bearing 093°, and Tree Rock, the northwestern point, bearing 204°.

10–21 **Kwaiawata Island** (*8°55′ S., 151°55′ E., H. O. Chart 5912*), situated 3 miles northwestward of Gawa Island, is an elevated atoll, 562 feet high. A fringing reef extends from the northwestern and southwestern sides of the island, but in other places the island is very steep-to. The eastern and western points of the island consist of perpendicular cliffs, with numerous caves.

The lake, which is 325 feet above sea level, is surrounded by villages and extensive gardens.

Anchorage.—A belt of anchoring ground, sand, gradually shoals toward the fringing reef.

Dugumenu Island, 220 feet high, lies 6 miles northward of Kwaiawata Island. This coral island is covered with coconut palms.

Anchorage.—There is anchorage for large vessels off the coastal reef of the island.

10–22 **Iwa (Jouveney) Island,** the northernmost of the group, is situated 15 miles northwestward of Dugumanu Island, but is reported to lie 2 miles northwestward of its charted position. The island, 465 feet high and thickly wooded, consists of a series of irregular coral terraces and precipices and presents steep cliffs to the sea. There is a village at the western point of a small sandy beach.

10–23 **KIRIWINA OR TROBRIAND ISLANDS.**—This group of islands lies about 80 miles westward of Murua Island.

Inhabitants.—The population of the group is about 8,570. The natives, who are friendly and hospitable, are proficient in the art of carving articles inlaid with mother-of-pearl.

Kiriwina Island (*southern extremity, 8°48′ S., 151°08′ E., H. O. Chart 5912 and B. A. Chart 2055*), the northern part known as Bwoioa, is the largest of the group. The island is about 25 miles in length in a north and south direction, by 1½ to 6½ miles in breadth; densely wooded, and of almost uniform height, the tops of the trees being about 150 feet high.

The northern and eastern sides of the island are fringed by a reef, which extends from 200 to 600 yards offshore, in places, and there is practically no anchorage off these two sides. The extensive bay on the western side is obstructed by a reef which extends nearly to the entrance points.

Embarakana (Omarakana) village, where there is a prominent church, lies one mile inland from the northeastern side of the island. Olivelevi village is located on the southwestwestern side of Muiao Bay, about 4 miles southward of Embarakana. Wawera, on the eastern side of the island, is 9½ miles southward of Embarakana. Both villages have boat passages through the fringing reef, temporary anchorage may be found outside.

Anchorage is also found in 15 to 25 fathoms, northwestward of the jetty, in Muiao Bay; although heavy swells often roll into the bay.

A shoal boat channel, marked by poles leads along the northern side of the bay to small piers at Losuia. The least depth in the bar, southward of Boli Point, in the approach to Losuia jetty is 3 feet.

On the northwestern side of the island is Kaibola village; and on the shore of the large bay on the western side of the island are the villages of Kavatari, Taiava, Oburaka, and Sinaket.

There is a hospital and government station at Losuia.

10–24 **Anchorage.**—Vessels up to 450 feet in length and with drafts up to 28 feet may anchor about 4 miles westward of Losuia with Kadalawa Point, the western end of Kiriwina, bearing 336° and Boli Point, which lies about 1¾ miles southeastward of Kadalawa Point, bearing 052°.

There are two 30-fathom anchorage berths southwestward of Sia Islet, the 30-foot islet that lies about 100 yards off the north-northwestern coast of Kiriwina Island. A landing stage, suitable for shallow-draft vessels, is located on the Kiriwina shore about 300 yards southwestward of Sia Islet. A good sheltered **anchorage** can be taken in 7 to 9 fathoms about 1 mile southwestward of Boli Point.

A **rock,** with a depth of less than 6 feet, lies about three-fourths of a mile southwestward of Boli Point.

Light.—A light is shown from Cape Denis (Bomatu Point), the northern extremity of Kiriwina Island.

Breakers have been reported in a position about 3½ miles east-southeastward of Cape Denis.

10–25 **Vakuta Island,** horseshoe shaped, lies close off the southern extremity of Kiriwina Island, with a boat passage between them. Reefs extend southward from the southwestern extremity of the island. A good passage with a depth of 10 fathoms is charted through the reefs.

Kitava or Nowan Island (*8°37′ S., 151°20′ E., H. O. Chart 2962*), situated 10 miles eastward of the middle of Kiriwina Island, appears to be a former atoll, 300 to 400 feet high. The central plateau of the island is surrounded by a wooded coral rim, 50 to 100 feet above the level of the plateau. There are 13 villages on this island, and the natives are peaceful and industrious.

There is **anchorage** all around this island; but during the southeast monsoon the best anchorage in a depth of 10 fathoms may be obtained 300 yards northward of the northern point Uratu Islet, lying close off the western side of Kitava.

Rock.—There is a dangerous rock located about 1¼ miles southwestward of Uratu Islet.

Kaileuna Island, 150 feet high to the top of the trees, lies 1¼ miles westward of the west extremity of Kiriwina Island.

There appears to be a good deep channel about 1 mile wide between the islands. No bottom at a depth of 8 fathoms was obtained in the northern part of the channel. Southward of Kaileuna Island some detached coral patches are situated on the western side of the channel.

10–26 **Islets.**—Boimagi Islet lies 5¼ miles northwestward of the northern point of Kaileuna Island. Five islets lie on a reef situated southwestward of Kaileuna. Nubiam Islet lies 1½ miles southward of the southernmost islet, lying on the above reef; and has foul ground extending 1 mile northwestward, and a reef extending 1 mile southwestward from the western end. A line of detached patches lies southwestward of the extremity of the reef.

A vessel passed between Nubiam Islet and the 100-foot islet northward of it; and anchored in a depth of 14 fathoms, sand, under the northern side of Nubiam Islet.

10–27 **Lusancay Islands and Reefs** (*B. A. Chart 2055*) extend from about 10 to 60 miles westward of the northern end of Kiriwina Island. The trees on these islands are from 100 to 200 feet in height. Between this chain of islands and Cape Ward Hunt, situated 115 miles westward, are charted many

reefs seen by D'Entrecasteaux; their neighborhood should be avoided.

Nauria Island *(8°32' S., 150°15' E.)* 200 feet high, is the southwesternmost of the group. Rothwell Bank, a sandbank with low trees on it, lies 22 miles southwestward of Nauria, and between the bank and island are three shoal patches. An islet is reported to lie 12 miles westward of Nauria.

Current.—It was reported that on approaching the Lusancay Islands and Reefs from the northward, when within 60 miles of them, a current of 2 knots setting 310° was encountered, and was experienced till within a few miles of the reefs.

Caution.—Passages through the Lusancay Islands and Reefs should not be attempted except in the finest weather, and with the sun in a favorable position. Many of the reefs are very long and thin, running in a northwest and southeast direction; it is difficult to find a passage through them.

Owing to the many reefs between Lusancay Island, and Goodenough Island to the southward, it has been reported that navigation in this area is considered only practical for small vessels of light draft (under 10 feet), in good light.

10–28 **Recommended tracks.**—For details of recommended tracks, buoyage, and dangers between the Kiriwina, Goodenough and Fergusson Islands, see *B. A. Chart 2055*. Many of the buoys on the recommended tracks are out of position or missing, position should be ascertained by bearings on known objects.

10–29 **Dangers southward of Kiriwina group.**—The whole area from the southern end of Kiriwina Island to Goodenough and Fergusson Islands is encumbered with reefs. The eye is the only guide for navigation, and the water is so clear that there is no difficulty in seeing the reefs from aloft. The reefs are not steep-to, and anchorage may be obtained in their vicinity. There are a number of islets, from 10 to 60 feet high, among the reefs and their positions are best noted on the chart.

Tides.—The high-water interval at full and change at Kiriwina Islands is 5h. 00m.; springs rise 3 feet, neaps 2 feet.

10–30 **D'ENTRECASTEAUX ISLANDS** lie between Kiriwina Islands and the eastern extremity of New Guinea. The group consists of three principal large islands, Normanby, Fergusson, and Goodenough, besides a very large number of islets. The population is about 40,000.

10–31 **NORMANBY (DUAN) ISLAND,** the southeasternmost of the group is about 40 miles in length, in a northwest and southeast direction. The whole island is wooded, except a large mountain near the middle, which is bare, high, and rocky. The island has a narrow mountain range with deeply furrowed sides and wide valleys. The range attains an elevation of 3,370 feet at the northwestern end of the island. The coast has very little fringing reef.

The inhabitants, who are of the usual Papuan type, belong to various tribes and speak different languages. The natives are more numerous in the northwestern part, and have extensively cultivated the hillsides.

The southern coast of Normanby Island, forming the northern side of Goschen Strait, has been described in section 8–143.

Southwestern coast of Normanby Island.—From Cape Prevost *(10°06' S., 150°58' E.)* the southwestern point of the island, the coast takes a sharp turn northward and froms Massie (Lebudowa) Bay, 3½ miles northward of the cape. The bay, which abounds in coral patches, has not been thoroughly examined. A shoal, with a depth of 1½ fathoms, lies in the entrance of Massie Bay. The coastal range of hills dips considerably near the center of Massie Bay, but rises again as Double Peak, 10 miles northward, is approached.

10–32 Cape Chesterfield (Varamumua Point), 6 miles north-northwestward of Cape Prevost, is rounded and of moderate height.

About ¾ mile southward of Cape Chesterfield are two tree-covered islets, about 200 yards apart, that lie on a drying reef. Reefs extend about 2½ miles to the southward of Cape Chesterfield and terminate at a 2-fathom depth.

10–33 Sewa Bay *(10°02′S., 150°58′E.)*, situated east of Cape Chesterfield, is a large and protected harbor. The entrance to the bay is almost closed by Vasea Islet, which divides the entrance into two openings. The northern passage is very shallow and is suitable only for small boats. The southern passage is about 200 yards wide, with depths of about 27 fathoms through its center.

The southeastern side of the bay is completely sheltered by high land. The northern end of the bay is indented by Martin Treacy Harbor, and the southeastern end is indented by Thring Harbor (Bwaguda Bay). General depths in the bay vary from 6 to 27 fathoms.

Malaria is prevalent in the bay.

10–34 **Dangers in approach.**—Outer Rocks lie about 1 mile 235° from Entrance Islet. These rocks lie in a northwest-southeasterly direction, and are about 600 yards in extent. Two of the rocks are visible above water, with heights of 2 and 4 feet; the group should be given a berth of at least 400 yards.

A 7-foot patch lies about 1.2 miles northwestward, and a 2-fathom patch lies 1.7 miles westward of Outer Rocks. A 32-foot patch lies about 400 yards southwestward of the 7-foot patch.

Whyalla Rock, with a depth of 52 feet, lies about 1.2 miles south-southwestward of Outer Rocks.

Entrance Islet is a small islet, surrounded by a 100-yard fringe of sunken rocks, lying about 1,400 yards southward of the south entrance to the bay.

Vasea (Pwasiai) Islet, which almost blocks the entrance to Sewa Bay, is fringed on the southern and eastern sides by sunken rocks to a distance of 100 yards. The islet is 315 feet high. Between its north end and the mainland there is a boat entrance over a reef of sunken rocks, about 150 yards wide.

10–35 **Dangers within Sewa Bay.**—An 8-foot shoal lies about 200 yards northward of Cape Cumberlege (Buiueta Point), the headland forming the eastern side of the southern entrance. Between this shoal and the south extremity of the reef extending southward from Randolph Point is a deep channel, about 300 yards wide, leading into the bay. Numerous rocks and shoals front the shores of the bay as far as 600 yards offshore in places. In the entrance to Thring Harbor is Powles Rock, with a depth of 2 fathoms. Nusa Rock, with a depth of 2 fathoms, and Patric Patch, with a depth of 5 fathoms, are off the eastern side of the outer part of Thring Harbor. Reefs extend about 400 yards northeastward from Powles Point, the western entrance point of Thring Harbor. Hensby Shoal, a submerged danger, and Una Rock, which dries 4 feet, lie about 400 yards northward and westward of the unnamed point one-half of a mile westward of Powles Point.

Whittle Reefs, consisting of several drying, above water, and submerged dangers, lie closely grouped about 1,200 yards northward of Powles Point.

Destroyer Spit, a submerged reef, extends nearly 700 yards from the shore eastward of Whittle Reefs.

With the exception of the above dangers, the greater part of Sewa Bay is clear and deep.

Anchorage.—It is reported that anchorage in a depth of about 10 fathoms can be obtained in Martin Treacy Harbor or Thring Harbor.

Note.—The latest information on *B. A. Chart 944* shows a difference of 1′ or more in latitude and longitude as compared with *H. O. 2929*.

Coast.—Northward of Cape Chesterfield the coast forms a succession of small bays as far as Malimali Bay, distant 3½ miles. The coastal range continues level and is densely wooded.

Malimali Bay is about 800 yards in length, by 200 yards in breadth. The shores of the

bay are densely wooded and bordered with mangrove. A stream discharges into the head of the bay.

Anchorage.—The bay affords anchorage for small vessels in a depth of about 22 fathoms, mud, but the anchorage area is decreased by the shallow banks which line its shores. During strong northwesterly winds it is advisable to anchor farther out.

10–36 Duchess (Uruma) Islet *(9°57′ S., 150°50′ E.)*, lying 2¾ miles westward of the southern entrance point of Malimali Bay, is thickly wooded and has a saddle-shaped top, 200 feet high. A strip of coral and sand beach borders the northern and eastern sides of the islet, but landing appeared difficult.

A reef, the southern end of which breaks, extends 3½ miles south-southwestward and about 5 miles southward from the western extremity of the islet. Detached patches of coral exist 1¼ miles northeastward from the islet. A channel, which has a width of 1 mile and depths of 58 fathoms, lies between the patches and Normanby Island.

Coast.—The coast of Normanby Island from Malimali Bay continues 8½ miles in a northwesterly direction and forms Perry Bay, which has numerous small indentations. Perry (Sobasoba) Islet, situated close southwestward of the northwestern entrance point of Perry Bay, is low and flat, and appears to be joined to the coast by a reef.

The main ridge of Normanby Island, after dipping considerably and becoming somewhat level in Massie Bay, again rises toward the middle of Perry Bay to a conspicuous double peak, 2,700 feet high. The peak is thickly covered with trees and affords an excellent landmark.

Sunken coral patches extend in a direction nearly parallel to the coast between Duchess Islet and Cape Deedes, and vary in distance from the shore from 2 to 4 miles.

Caution.—The positions assigned to these patches upon the chart must be considered as approximately only, and it is probable that others exist farther westward. It is therefore recommended to avoid approaching the western coast of Normanby Island nearer than 8 miles.

10–37 Coast.—Cape Deedes or Puri, situated 3 miles northwestward of Perry Islet, is a dark, densely wooded point. One mile westward of the cape no bottom could be found at a depth of 17 fathoms, nor were any dangers seen 2 miles farther westward.

Ubula Islet lies close southeastward of Cape Deedes; sunken reefs extend southeastward of this islet for about 2 miles.

Between Cape Deedes and Paipainina Point, 4¼ miles northward, the coast forms a slight indentation, and the densely wooded hills descend steeply to the sea.

Observation (Gabagabawa) Islet, situated close northwestward of Paipainina Point, and connected with the mainland by a sunken ledge, is small, steep, rocky, and densely wooded. Some rocks extend one-half of a mile southward from the islet.

A reef, the position of which is doubtful, lies 1½ miles southwestward of the islet; another reef lies 3 miles southwestward of the same islet.

10–38 Cape Dawson *(9°42′ S., 150°45′ E.)*, the northwestern point of Normanby Island, is a well-marked bluff, with deep water within a mile of the shore. The cape forms the southern entrance point to Dawson Strait, which separates Fergusson Island from Normanby Island.

Solomon Peak, the mountain of Normanby Island, situated about 4 miles within Cape Dawson, rises in the form of a blunt cone with a small double-notched summit 3,370 feet high. This peak is similar in appearance to the 2,700-foot double peak previously mentioned, both rising from the main ridge or backbone of Normanby Island, which makes a considerable dip between them.

Anchorage was taken 200 yards southeastward of a projecting tongue of coral lying 2 miles east-southeastward of Cape Dawson. The tongue is marked by a black rock showing at high water. Near this anchorage a stream of fresh water discharges into the sea. Many villages were seen upon the spurs and summits of the hills overlooking the anchorage.

10–39 **Northeastern and eastern coasts of** Normanby Island.—Little is known about these two coasts of Normanby Island. Awaiara (Sewataitai) Bay is entered about 25 miles southeastward of Cape Dawson, and eastward from this bay, the coast trends about 6 miles northeastward to Cape Pierson or Babaclinai Point. The eastern coast is backed by a range of mountains and is reported to be deeply indented in places.

A shoal is reported to lie 2 to 4 miles off, parallel to the middle of the eastern coast. The shoal is about 3 miles in length and has depths of from 4 to 5 fathoms.

10–40 FERGUSSON ISLAND, the largest of the D'Entrecasteaux Group, lies northwestward of Normanby Island, and is separated from it by Dawson Strait. The island is about 34 miles in length by 25 miles in breadth.

Three great mountain masses rise from the island as follows: Mount Kilkerran or Koitabu, a sharp cone about 6,800 feet high, on the northeastern side; Maybole Range, 4,172 feet high, and Kubioia Range, 3,000 to 4,000 feet high, on the western side; and Endagwaba Range, 4,000 to 5,000 feet high, on the southern side. The southeastern portion of the island is of irregular outline, and has several low hills and deep bays.

In the neighborhood of Seymour Bay, on the southwestern coast, there are saline lakes and several small hills giving forth sulphur fumes, and there are also several boiling springs.

The island has numerous inhabitants. The lower slopes of the hills are cultivated, while the upper parts are covered with forest.

10–41 **Dawson Strait,** which separates Fergusson Island from Normanby Island, varies greatly in width. Mewadi (Harris) Islet lies about 13 miles southeastward of Cape Dawson. Numerous reefs and other small islets lie off Dobu Islet, situated in the eastern entrance of the Strait.

Directions.—Vessels should approach the strait with Saramo Point, the northern entrance point, in range 062°; with the southern edge of a double-topped hill located about 5½ miles north-northeastward of Ebeoa Point. The summit of Dobu Islet bearing 117° leads through the strait. When the northern edge of Kwaiope Island bears 070°, the course is altered to that bearing. About 1 mile from Kwaiope, alter course to the northeastward; and proceed through the channel northward of Kwaiope, when the southern edge of Sanaroa bears 070°.

This course leads in a depth of 6 fathoms, although a 4- and 3-fathom spot lies on the northern side of the channel. When the 696-foot summit at the northern end of Sanaroa bears 023°, follow this bearing until Scrubb Islet, the southwesternmost islet of a group located off the southwest extremity of Sanaroa bears 131°, and the leading marks on Benalla Point, on the east side of Fergusson Island, are in range 311°. On course 311° a vessel passes through a narrow channel between the scattered reefs extending from Fergusson to Sanaroa. When the northwest extremity of Sanaroa bears 035° change course to 353° and pass about 800 yards westward of the reef extending northwestward from Urewala Island.

10–42 **Dobu (Goulvain) Island** *(9°45 S., 150°51′E.)* lying in the eastern entrance of Dawson Strait, is a volcanic origin; and in the center there is an extinct crater, 900 feet high. The flat country and low hills on the southern side of the island are covered with palms. The natives are numerous on the island.

SEE SHORT CORRECTIONS

Nekumara (Epidermis) and Kwaiope (Scaley) are two islands on the same reef, located within 3 miles northeastward of Dobu. The former is thickly populated. Kwaiope is about 1½ miles southward of Kwaia Point, on Fergusson Island. The passage between Kwaiope and Kwaia Point is about ½ mile wide between the fringing reef of the islet and a drying reef terminating in a 3-fathom spit extending from Kwaia Point. There are depths of 4 to 6 fathoms in mid-channel.

The passages leading northeastward and southwestward of Dobu Island are reported foul.

Cape Doubtful (Kwaia), the eastern extremity of Fergusson Island is a tongue-shaped promontory of moderate height.

Sanaroa (Welle) Island, 696 feet high, situated 3 miles northeastward of Cape Doubtful, is connected to the cape by a sunken ridge. The island is of volcanic origin. Shoals and reefs, which break, lie southeastward and southwestward of the island.

The passage between Sanaroa and Fergusson Islands is very narrow, and should not be attempted except with local knowledge.

10–43 Southern coast of Fergusson Island.—Ebeoa (Llewellyn Point) is the extremity of a narrow peninsular projecting southwestward from Cape Doubtful. Two bays, with villages on the shores, lie on the eastern and western sides of the peninsula; with reefs surrounding the extremity of the peninsula. A double-topped hill, about 1,200 feet high, is conspicuously located about 5½ miles north-northeastward of Ebeoa Point and rises to a height of 1,770 feet about 2 miles further northward, on the edge of a crater.

Saramo (Aggie) Point, about 3½ miles northwestward of Ebeoa peninsula, is steep and rocky. The point forms the southeastern termination of the lofty range which extends along the greater part of the southern coast.

Between Saramo Point and Amphlett Point, 9 miles westward, the coast is steep and wooded. The latter point is rounded and not prominent. There are several villages on the coast between these points.

Westward from Amphlett Point the remainder of the southern coast forms a slight indentation. This part of the coast is densely wooded, and there are a few villages and sandy beaches.

10–44 Cape Mourilyan *(9°38′ S., 150°26′ E.)*, the southwestern extremity of Fergusson Island, is bold and well defined. A narrow strip of coral fringes the cape, and there is a village on the southern side.

10–45 Western coast of Fergusson Island.—Seymour Bay, lying immediately northward of Cape Mourilyan, indents the coast to a distance of 5 miles, and is 6 miles across between the entrance points. The bay is encumbered with coral patches, some of which are charted. Naura (Naua) Islet lies close northward of the southern entrance point, and Tumagabuna Islets lie close southward of the northern entrance point.

Coast.—From the Tumagabuna Islets the coast trends to the northward for about 8 miles, forming the northeastern shore of Moresby Strait.

Northern coast of Fergusson Island.—From the northern entrance of Moresby Strait the coast trends about 6 miles northeastward to Cape Labillardiere, the northern extremity of the island. Immediately eastward of the cape is a cove with a depth of 15 fathoms, sand.

Between the cove and Hughes Bay, 10 miles east-southeastward, the coast is steep and bare, and has no anchorages. Paia Creek discharges into the head of Hughes Bay, where there are several villages. Cape Vinall (Maiyan Point) is the northeastern extremity of the island and Hughes Bay. There is a strong northwesterly current along the north coast of the island during the month of November.

10–46 Islands lying northward of Fergusson Island.—Sunday Islet *(9°16′ S., 150°31′ E.)* lies 3½ miles northward of Cape Labillardiere; a sandbank lies close eastward of the islet.

Reefs extend southward from Sunday Islet, and about 2½ miles southward of the islet on the northern side of the recom-

mended track is a 2-fathom patch. A 9-foot shoal lies about one-half of a mile eastward of the 2-fathom patch, and in this vicinity are other dangers. Caution should be used in navigating throughout this area.

Foul ground extends for a considerable distance, northwestward through northeastward, from Sunday Islet. A 6-foot shoal was reported (1954) in a position about 10½ miles east-northeastward of Sunday Islet, close northward of the recommended track through this area.

Amphlett Group, consisting of 6 islands and numerous smaller islets, lies from 6 to 13 miles northward of Cape Vinall; the track leads northward of them.

10–47 Wamea Island, 1,361 feet high, is the easternmost of the group. There are two villages, one of which is built on a narrow rocky saddle. Foul ground is charted 1 mile southward from the southern end of the island.

Hygeia Shoal lies 2 miles eastward of the eastern side of the island. Pigeon Rock, 156 feet high, stands on a reef situated 1,400 yards westward of the western side of the island; between the rock and the shore are two shoal patches.

Wright Patch and Crook Patch, each with depths of less than 6 feet, lie, respectively, 2¾ and 6½ miles northward of the north extremity of Wamea Island. A depth of less than 6 feet also lies 4.2 miles 040° from Pigeon Rock.

McGee Patch, an 8-foot shoal lies near a turn of the recommended track in a position 4¾ miles northwestward of Pigeon Rock.

Pigeon Rock is steep-to, and it is reported that it can be passed on the western side 50 yards off.

Anchorage in depths of from 12 to 14 fathoms may be obtained in a small bay lying immediately eastward of a reef projecting from the western side of Wamea Island.

Current.—During the month of November a strong current setting to the northwestward has been experienced along the northern coast of Fergusson Island.

Abnormal magnetic variation is reported 15 miles eastward of Cape Vinall.

10–48 GOODENOUGH ISLAND, the northwesternmost of the D'Entrecasteaux group, is separated from Fergusson Island by Moresby Strait. The island is 20 miles long in a northwest and southeast direction; lofty mountains traverse its whole length, attaining an elevation of 8,350 feet near the northern end. The island is well populated.

10–49 Moresby Strait is about 9 miles long between northern and southern entrances and has considerable depths. It has not been thoroughly examined, but there are known to be several steep-to, mushroom-shaped coral patches. Inside the entrances, the strait is considerably widened by Seymour Bay (sec. 10–45) on its eastern side and Mud Bay on its western side.

The southern entrance, between Cape Mourilyan (sec. 10–44) and Cape Watts, is about 8½ miles wide. Within the entrance the navigable channel is reduced in width by reefs extending in a northerly direction from the northern side of Cape Mourilyan. Small detached reefs lie about ½ mile southeastward of Dodogessa Island on the western side of the strait.

The northern entrance, about 2½ miles across, is obstructed by the Barrier Islands. There is a narrow channel on either side of these islands. The eastern channel is charted as dangerous, but the western channel has been swept and is believed clear of dangers. The western channel, known as Warrego Passage, lies between reefs that fringe Ilamu Island, the westernmost of the Barrier Islands, and, Watutu Point on Goodenough Island. This channel, about 400 yards wide, has a depth of 28 fathoms.

10–50 Cape Watts *(9°31′S., 150°21′E.)*, the southeastern point of Goodenough Island, is rocky and fringed with coral reef. A small crater, probably not long extinct, is situated on the cape. Northward of the cape, the wooded mountain range attains an elevation of 2,210 feet, and 1½ miles westward of the cape is a remarkable square topped summit, 1,820 feet high.

Dodogessa (Wagifa) (Wagipa) Island, the northwestern side of which is connected with the mainland by a reef with some islets on it, lies about 1½ miles northeastward of Cape Watts. The island, which is an extinct volcano, 540 feet high, is grass-covered and inhabited.

10–51 Anchorages.—Sheltered anchorage may be obtained in Mud Bay, situated about 3 miles northwestward of Dodogessa Island. Vessels may anchor in either of the bights formed by the point projection from the southern shore of the bay. Large vessels find the most suitable anchorage to be at the head of the bay in a depth of 25 fathoms.

Anchorage for large vessels in 28 fathoms is available in a cove near Beli Beli, about 2 miles northwestward of Watutu Point.

10–52 Directions.—Vessels from southward proceeding through Moresby Strait should round Cape Mourilyan at a distance of about ¾ mile and then alter course to steer 354° with the eastern extremity of Ilamu Island bearing ahead. The course 354° should be maintained until the center of Warrego Passage between the southwestern extremity of Ilamu Island and Watutu Point bears 307°, and then altering course to 307° a vessel should steer through Varrego Passage keeping in midchannel.

Vessels proceeding from southward to anchorage in Mud Bay should, after rounding Cape Mourilyan, steer 354° as described above until Tumabagana Islet in Seymour Bay bears 113° and is in range with Bray Hill about 1 mile eastward of the shore of that bay. The course should then be altered to steer 293° until Dodogessa Island summit bears 176°; thence from the latter position the course 245° until Coconut Point, about 1¼ mile northward of Dodgessa Island, bears 130° when the course may be altered as necessary for anchorage.

Vessels proceeding from southward through Moresby Strait to the anchorage about 2 miles northwestward of Watutu Point should, after clearing Warrego Passage, haul around gradually to port.

Note.—Recommended tracks for Moresby Strait and its approaches are shown on *B.A. Chart 2055*. See section 10–28.

Signal station.—A signal station is established 150 feet, 270° from the eastern end of Watutu Point.

10–53 Beli Beli (*9°22′ S., 150°22′ E.*) is located on the eastern coast of Goodenough Island about 2 miles northwestward of Watutu Point.

To a vessel approaching the harbor, the general contour of the land appears as high hills in the background, with Mt. Goodenough the first high land picked up. The land appears dark blue-gray, and does not blend with the horizon. The shore line of the harbor is rocky and studded with palm trees. All beaches suitable for landing are located around the horseshoe; they are flat and offer no protection. The beaches are of coral, have a few bushes on them, and are protected by reefs.

Entrance Channel—Buoyage.—Approach to the harbor is best made during daylight. No buoys mark the outer approach, but an unlighted buoy and several markers are located on reefs in the inner approach. To enter the channel leading to Beli Beli anchorage, line up the jetty with Mt. Goodenough.

The entrance channel is narrow and coral-bound; with a maximum width of one-half of a mile, and a minimum depth of 5 fathoms. Deep water is in midchannel. A clear night is necessary for in-bound vessels navigating the channel. Out-bound navigation has been found easier than in-bound.

Pilotage.—Pilotage service is available.

Anchorages—Tides.—The mooring area is landlocked with deep water close to the shore (400 yards). The anchorage area has depths of 8 to 20 fathoms, dropping sharply, mud

bottom. No moorings are provided.

Normal tide range is 3 to 4 feet, seasonal 5 to 6 feet. No currents are encountered inside the harbor, and moored vessels need not be headed for the open sea. Use of both anchors is not necessary.

Weather.—Normal weather conditions are good; quick storms are uncommon. Prevailing winds are southeast and northeast. The wet season occurs toward the end of summer, and the dry season during autumn and winter.

10–54 Port facilities.—Talafatama Jetty, suitable only for boats, is located at the head of Beli Beli Harbor. About 1,100 yards southeastward of the jetty is a T-head pier, 300 feet long with a least depth of 30 feet alongside. Another T-head pier, 280 feet long is located about 1,500 yards southeastward of the jetty, and has a least depth of 29 feet alongside. White drum buoys are moored in 5 fathoms northwestward and southeastward of these piers. The water shoals to a few feet inside the line of these buoys.

It is reported that the port can handle two vessels at the piers, and two at the anchorage. Ship's gear is used in discharging cargo. There is a floating crane for handling heavy cargo.

Good water is available, but there are no facilities for supplying it to vessels. Water should be chlorinated before using. Small quantities of sweetpotatoes, yams, bananas, limes, and paw paws are available.

10–55 **Malauna Bay** *(9°14′ S., 150°18′ E.)*, about 9 miles north-northwestward of Beli Beli, is approached from southward. The bay contains numerous shoals, many of which are marked by white or red drums. Knight Point, the western entrance point of Malauna Bay, bearing 290° leads into the outer part clear of all dangers. The bay is well sheltered from southeasterly winds. Good anchorage is afforded in 7 to 11 fathoms, mud.

10–56 **Cape Lahaye**, the northern point of Goodenough Island, is low and wooded. From here the northern coast, fronted by reefs, trends in a southeast direction for 14 miles to Watutu Point, and has a low coastal ridge running parallel to it with off-lying reefs.

To the westward of the cape the coast has a general west-southwest direction for about 10 miles to Cape Rawlinson, the western extremity of the island. The spurs from the main ridge approach the generally rocky shore line, which now assumes a bold aspect.

Nuama (Huamata) and Siata Islets lie 1 mile and 3 miles, respectively, northwestward of Cape Lahaye. The former islet is covered with grass and scrub, and has a double peak, 200 feet high; the latter is wooded and 80 feet high.

An extensive and intricate mass of reefs surrounds the islets and fronts the northwestern coast of Goodenough Island. A vessel which steered a 232° course, about midway between the two islets, passed through the reefs in depths of from 12 to 17 fathoms. This passage should not be attempted except in fine weather, with good light.

10–57 **Cape Womobu** *(9°22′ S., 150°06′ E.)*, situated 3½ miles south-southeastward of Cape Rawlinson, is a narrow promontory, 150 feet high; with foul ground extending 1 mile westward and southwestward from it. On the southeastern side of the cape is a deep bay. A shoal lies 2½ miles north-northwestward of the cape, and 1½ miles offshore; there are possibly other off-lying patches, as the vicinity has not been closely examined.

Cape Varieta, lying 3 miles southeastward of Cape Womobu, is a cliff, 160 feet high. The land northward of the cape attains an elevation of 1,760 feet. A small bay with a depth of 40 fathoms lies on the eastern side of the cape, and a stream, where good water may be obtained, discharges into the head of the bay.

Anchorage in a depth of 26 fathoms, sand and coral, may be obtained 700 yards southeastward of the cape and 500 yards offshore.

10–58 EAST CAPE TO CAPE OF GOOD HOPE.—From East Cape *(10°13′ S., 150°53′ E.)* the northern coast of the peninsula, which forms the extreme eastern end of New Guinea, is rocky and steep, and comprises several small bays to Basilisk Point. The water in these bays is deep and affords no anchorage.

Basilisk Point is situated 10 miles westward of East Cape and immediately over and to the southward of it rises Mount Binumu or Killerton, previously referred to in section 8–100.

10–59 Bentley Bay, between Basilisk Point and Cape Ducie, 6½ miles west-northwestward, affords a fair anchorage, the water being deep close to the shore. The land rises precipitously in a series of densely wooded hills; separated from each other by deep gorges and narrow valleys, here and there opening out into small plains as they approach the shore.

Anchorage in a depth of 15 fathoms, sand, has been taken 1 mile off the reef-fringed western shore of the bay.

Cape Ducie, northwestward of Bentley Bay, is low, rocky, and thickly wooded, and appears like an island from the eastward. The cape is steep-to on its northern side, but to the eastward a sunken reef extends to a distance of nearly a mile, having a small cay upon it which dries 4 feet. This reef also extends to the southward, blocking up the western entrance of Annie Inlet (Netuli Bay) and joining Catharine Island to Cape Ducie.

Catharine (Netuli) Island, low and covered with mangrove trees, lies in the approach to Annie Inlet. A narrow passage, with a depth of 20 fathoms, leads into the inlet between the reef-fringed southern extremity of Catharine Island and the mainland. The inlet, the shores of which appeared to be bordered with mangrove swamp, has not been explored, but is probably blocked with reef.

Excellent Point (Hulana Cape), 2½ miles westward of Cape Ducie, is similar to it in appearance. A bay, having its shores lined with mangrove swamps, lies between the two points.

10–60 Awaiama (Chads) Bay, which is picturesque in appearance, lies immediately westward of Excellent Point. The eastern shore of the bay is fringed with reef, and there appears to be anchorage at the head of the bay. Several villages line the shores of the bay. Emurimuri Point (Puni Puni), the western entrance point of the bay, is a prominent cliff; and southward of the point are the two Finger Peaks, 2,500 feet high, which appear conspicuous from the eastward.

The Stirling Range continues to increase in altitude to the westward, and at Cape Frere, the mountains are estimated to be between 3,000 and 4,000 feet high. Their aspect is different after passing Excellent Point, as the slopes facing the sea become covered with grass, the summits are thickly wooded, and at the base a broad belt of cultivated land extends to the seacoast. There are five mission stations on this stretch of coast.

10–61 Cape Frere (Girumia) *(10°05′S., 150°11′E.),* situated 23 miles westward of Excellent Point, is a bold, steep bluff, rising to a round summit, about 3,000 feet high. The sides of the mountains of this headland are covered with grass and intersected with numerous ravines running nearly parallel to each other.

Numerous cascades and watercourses may be seen on the mountain sides as Cape Frere is approached.

Soundings.—No bottom at a depth of 100 fathoms could be obtained one-half of a mile northward of Cape Frere, which is steep-to and has no fringing coral reef.

Between Excellent Point and Cape Frere the coast appears to be free from dangers. At 3½ miles offshore the depth is 760 fathoms, and with one-half of a mile of the coast bottom is seldom found with 60-fathom soundings.

10–62 GOODENOUGH BAY is about 23 miles in width between Cape Frere and Glen Islet, situated north-northwestward of the cape, and 25 miles in length in a westerly direction. The bay has considerable depths,

making anchorage impossible. The southwestern shore is steep-to, and the northern is in most places. The water at the head of the bay is discolored.

Five peculiar pinnacle-like peaks are situated about 26 miles west-northwestward of Cape Frere near the coast; grouped together, they stand well out and appear prominent from the eastward.

At the head of the bay, where the direction of the coast line changes, the lofty grassland ceases, and the ridge of high mountains continues its northwesterly trend. The coastal range on the northern side of the bay is composed of hills of inferior altitude and of different shape and formation.

Many villages line the shores of the bay and are situated on the belt of alluvial land which extends along the foot of the mountains.

10–63 **Bartle (Baunia) Bay,** situated immediately westward of Cape Frere, is about 4 miles wide and indents the coast to a distance of 1¾ miles. Several streams flow into the bay.

The country at the back of Bartle Bay forms a succession of table lands, increasing in height from 200 to 1,500 feet. All the terraces are covered with long grass.

Anchorage, in a depth of 15 fathoms, may be obtained by small vessels off the principal village in the bay. There is no good anchorage for larger vessels, the depth being 49 fathoms at the head of the bay.

The whole area is clear of dangers, and reported to be safe for vessels of any size.

A **mooring buoy** lies close offshore, in the southwestern part of the bay.

Coast.—The entrance to Dogura Bay lies about 16 miles west-northwestward of Cape Frere.

Rebuda Bay is an indentation in the coast about midway between Dogura Bay and the head of Goodenough Bay.

The coast between the head of Goodenough Bay and Rawdon Bay, 12 miles eastward, is for the most part low, the hills being from 300 to 400 feet high, and thickly wooded.

10–64 **Rawdon Bay.—Mosquito Islands** *(9° 47′ S., 149° 54′ E.),* two in number, lie in the entrance to Rawdon Bay, where there are depths of 20 fathoms, mud. The islands are low, flat, of coral formation, and wooded. Abuaru village is situated on the shore of the bay.

On Baniara, the larger and inner island, is a government station. A small jetty with a depth of 12 feet alongside its situated on the western side of the island.

A small shoal was reported to lie one-half of a mile offshore, and 5 miles westward of Baniara Island.

Anchorages.—Rawdon Bay affords anchorage in a depth of 8 fathoms, mud, about one-half of a mile from the villege within the islands.

Good anchorage in a depth of 16 fathoms, stiff mud, may be obtained one-half of a mile southward of the northern Mosquito Island.

Coast.—Between the entrance to Rawdon Bay and Glen Islet, 9½ miles east-northeastward, the coast continues low; the hills in the background are from 300 to 750 feet high.

10–65 Cape Vogel *(9° 40′ S., 150° 03′ E.).*—The hilly termination of the great promontory northward of Goodenough Bay is known as Cape Vogel; but there does not appear to be any particular point around its 15 miles of coast line to which the distinctive name is applied. When making this cape it will be noticed that the hills which form the peninsula are low and flat. Seen at a distance from the southeastward, a conical hill situated to the northward of the Mosquito Islets is first seen, appearing like an island. Other elevations gradually show upon nearer approach, and not until a vessel is within a distance of 8 miles does the land appear to be continuous.

10–66 Glen Islet, 35 feet high and marked by a few trees, is situated on the south end of a coral reef which fringes the southeastern extremity of Cape Vogel Peninsula to a distance of 800 yards.

A drying sandbank lies on the outer edge of the reef, and a detached patch is situated one-half of a mile southward of Glen Islet.

Sebiribiri Islet, 40 feet high and composed of mangroves, is situated 3 miles northward of Glen Islet. The islet lies 200 yards offshore and on the fringing coastal reef.

About three-fourths of a mile northwestward of Sebiribiri Islet and one-fourth of a mile offshore is a charted shoal, about 200 yards in extent.

10–67 **Yasaiasa (Iasi-Iasi) Anchorage** *(9° 40′ S., 150° 02′ E.).* Between Sebiribiri Islet and Kibirisi Point, the northeastern extremity of Cape Vogel Peninsula, is a bay, 3½ miles wide, at the head of which is Yasaiasa Anchorage and Tara Kwaruru River. The anchorage is sheltered from the prevailing southeasterly winds by Kairaga Islet and its reef, one-fourth of a mile in length. There is a narrow and shallow passage between Kairage Islet Reef and the fringing reef of the mainland.

Kairaga Islet, 15 feet high, is covered with bushes.

Iriwowono and Inageto villages lie southward of the anchorage; and westward of the latter village a stream, fronted by mangroves, discharges into the bay.

Target Patch, a coral patch with a least depth of 1 fathom, lies about 1,200 yards west-northwestward of the northwestern extremity of Kairaga Islet. There is a passage, 800 yards wide and clear of dangers, between the patch and Kairaga Islet Reef.

10–68 **Directions.—Anchorage.**—If approaching from the eastward, round the northern end of Kairaga Islet Reef, which usually shows distinctly, and steer for the anchorage.

Anchor in a depth of 18 fathoms, mud, with the northern extremity of Kairaga Islet bearing 085°, and Inageto village, bearing 209°; open southeastward of the mangrove promontory northeastward of it. This position barely gives 200 yards of swinging room; but a vessel will seldom swing toward either reef, as the southeasterly winds are rather steady.

Tara Kwaruru, situated at the western end of the bay is a salt water creek, entered between Rank Point, the eastern entrance point, and Greaves Point, the western entrance point. The reefs fringing the shore are steep-to.

Reefs.—Entrance Reef, with a depth of 1 fathom, lies 350 yards northeastward of Rank Point. A coral patch lies 400 yards northwestward of Entrance Reef, and about 200 yards off the fringing coastal reef.

Anchorage—Directions.—Anchorage may be obtained by small vessels at the entrance to the creek, in a depth of 19 fathoms, mud; with Rank Point bearing 063°, and Greaves Point 301°. This anchorage, however, is not recommended as it is too confined; only 150 yards of swinging room being available.

To steer for the anchorage, bring the two points on the eastern side of the creek, southwestward of Rank Point in range, bearing 215°, which leads nearly midway between Entrance Reef and the coral patch northwestward of it.

Tides.—The high-water interval at full and change at Yasaiasa anchorage is 5h. 00m.; springs rise 2½ feet.

10–69 **Coast.—Kibirisi Point,** situated 2 miles northward of Tara Kwaruru, is a black, rocky point, 20 feet in height.

Ipoteto (Ikara) Islet, 60 feet high to the top of the trees, lies close eastward of the point. The islet is fringed by a narrow reef and connected with the point by a shallow

ridge. The coast southward of the islet is fringed by a reef to a distance of about one-fourth of a mile.

Light.—A light is shown from Ipotete Island.

10–70 Ward Hunt Strait, about 16 miles in width between Cape Vogel and Goodenough Island, is encumbered by Dart Reefs and Keast Reef for two-thirds of its breadth. These reefs stretch across from Goodenough Island in isolated patches. The channel on the Cape Vogel side is 3 miles wide in its narrowest part between Keast Reef and Ipotete Island and is clear of danger. The channel between Goodenough Island, and the northeasternmost patch is 1½ miles wide and deep. There is no difficulty in navigating by either of them.

Aspect.—The shores of the strait present a great contrast. The northern coast of Goodenough Island rises to a height of upwards of 8,000 feet. The steep and thickly wooded mountain sides are visible at a great distance, although the summit is usually cloud capped. The southern side of the strait is grassy and undulating, lower, and of greater variety; the hills here not exceeding 600 or 700 feet in height. The generally low shore is fronted by small sand coral-girt islets and bays.

Dart Reefs, detached patches with a depth of about 1 fathom, extend about 13 miles southwestward from the southeastern point of Goodenough Island. The edges of the reefs are steep-to.

10–71 Keast Reef *(9°35′S., 150°04′E.)* with a depth of 1 fathom, lies 3½ miles westward of the western Dart reef, and breaks in a moderate swell.

Caution.—Except for Keast Reef, no other dangers were observed westward of Dart Reefs.

It was reported in 1944, that vessels are always set northward when passing through the strait.

10–72 **COLLINGWOOD BAY**, entered between the northern side of Cape Vogel and Cape Nelson, about 60 miles northwestward, is encumbered with many shoal patches, the positions of which are doubtful.

The whole of the southern and western shores of Collingwood Bay are low and flat. The plain is thickly covered with trees, extends 4 to 10 miles to the southward, and a much greater distance to the westward.

The northern part of the bay is bold, rocky, and steep. Mounts Victory and Trafalgar, 5,584 feet high, rising in a massive lump, and having the aspect of a large island when seen from a distance.

Mount Victory is an active volcano.

The Maisinia (Maisin) Hills, situated in the district of the same name, lies southward of Mount Trafalgar.

There are several villages on the shores of the bay, the houses being built on high piles.

Caution.—Until Collingwood Bay is more closely examined, it should be navigated only in the finest weather and with a lookout aloft.

10–73 Southern shore of Collingwood Bay.—Westward of Kibirisi Point the coast becomes bold; ranging from 220 to 100 feet in height, for about 4 miles. Dark Hill, 350 feet high, is near the coast, about 21 miles westward of Kibirisi Point, with Cone Peak attaining a height of 1,150 feet and Saddle Peak 1,095 feet, between. In the vicinity of Dark Hill, the coast range which has hitherto bordered the shore, ceases; and gives place to a thickly wooded plain extending 4 to 10 miles inland to the foot of the distant mountains; with here and there a small dark hill standing up from the surrounding level.

The coast is fringed with mangrove, fronted by reef in places. In many of the mangrove bights are coral islands that cannot be seen from a vessel 2 or 3 miles off; these afford numerous places of shelter for

small trading craft, in all weathers. There are no villages on the shore, but some distance inland on the grass-covered hills are numerous patches of cultivated ground, giving evidence of the presence of a considerable population.

There are many small islets of coral formation and scattered discolored patches of water, denoting shoals, lying off this part of the coast and extending westward to Fir Tree Point.

Anchorage, it is stated, can be obtained in many places along this coast for large vessels, with proper precautions.

10–74 **Jabbering Islets** *(9°37′ S., 149°54′ E.)* four in number, are situated 6 miles westward of Kibirisi Point. The islets are about 35 feet high and covered with bushes. A reef, with a sand cay at its extremity, extends three-fourths of a mile southeastward from the northeastern islet. The north islets were reported, in 1944, to be washed away, only reefs awash remaining.

Reefs extend in a northeasterly direction from the mainland toward the two southern islets and the middle islet.

Anchorage has been found among the northeastern group of these islets in a depth of 22 fathoms, sand; but caution is necessary as the surrounding reefs and islets rise nearly perpendicularly from considerable depths.

Sidney Islets, are reported to be only sandy shoals, situated 5 miles west-northwestward of Jabbering Islets and close offshore.

10–75 Pusi Pusi (Posi Posi) Harbor *(9° 36′ S., 149° 48′ E.)* is an irregular-shaped indentation in the coast line, southwestward of Sidney Islands, and has depths of 2 to 16 fathoms, but is encumbered by low coral islands overgrown with mangroves.

The eastern entrance is 400 yards wide, but the channel, apparently deep, is reduced to about 200 yards in width by reef extending off each point. The anchorage is shown on the plan in a depth of 16 fathoms.

10–76 Black Rocks *(9°34′ S., 149°32′ E.)* which dry 2 feet, lie 16 miles westward of Pusi Pusi Harbor and 2 miles offshore.

A sandy cay lies 1½ miles westward of Black Rocks, and the Jarrad and Hilda Islets lie about 1 mile offshore, between the sand cay and Fir Tree Point.

Moi Biri Bay lies between the Jarrad Islets and the mainland southward of them. A coral reef fringes the shores of the bay and, in places, extends about ½ mile offshore. At a village on the eastern shore of the bay, a jetty is built out to the edge of the reef. A flat-topped hill, 250 feet high, lies behind the village.

Fir Tree Point, about 10 miles westward of Black Rocks, is low and sandy. A shoal, with a depth of 2 fathoms, extends one-third of a mile northeastward from the point. A small stream discharges into the sea close to the point, and there are many villages on this stream.

Anchorage in a depth of 10 fathoms, mud, may be obtained one-half of a mile southeastward of Fir Tree Point, and also in a least depth of 5 fathoms northward of the point; but the water is apparently shallow off the shore to the westward.

Phillips Harbor lies with its eastern entrance point about 9½ miles westward of Fir Tree Point, and has general depths of from 7 to 8 fathoms. Close westward of the eastern entrance point is Sinapa Islet.

Garrandibut Islet (Cecelia) lies 1½ miles northward of Sinapa Islet, and Varau (Gowlland) Island, about ¼ mile offshore and 3 miles west-northwestward of Fir Tree Point.

10–77 **Western shore of Collingwood Bay.—Keppel Point,** about 11½ miles northward of Phillips Harbor, is low, and has a great deal of foul ground extending off it. The bight between the point and Phillips Harbor is encumbered with reefs.

10–78 Hardy Point *(9°08′ S., 149°19′ E.)* lying 11½ miles north-northeastward of Keppel Point, is the northeastern extremity of Collingwood Bay. The coast between the two points is fronted by detached reefs.

Sinipara (Hardy) Islet, about 1 mile southward of Hardy Point, is awash at high water, but would be covered at the highest tides.

SEE SHORT CORRECTIONS

Biteabout Harbor, a long inlet, is entered about 2 miles northward of Hardy Point.

Tufi Harbor, the entrance to which lies 3¾ miles northward of Hardy Point, has a government station, with a resident magistrate's office and other buildings. There is a jetty with a depth of 9 feet at its extremity, where vessels can berth.

10–79 Directions.—Vessels proceeding into Tufi Harbor steer 308½° until the small island 9 feet high, bears 325°. Steer for the island on this bearing until the white mark on the cliff inside is just open of the bluff, on which the magistrate's residence stands, bearing about 273°. This course leads into the harbor.

Small vessels have difficulty in anchoring in the inlet owing to the great depth of water.

10–80 Dangers.—Veale Reef, a small submerged patch, lies about 11¼ miles southeastward of the front range of Tufi Harbor. Between Veale Reef and Hardy Point, which includes Ham Reef, close southwestward of the range line and 1¾ miles westward of Veale Reef, are numerous shoal patches.

A large reef with less than 6 feet of water lies at latitude 9°20′ S., longitude 149°30′ E., about 18½ miles southeastward of the front range light at Tufi Harbor.

Black Headed Rocks, which dry 3 feet, are charted from 8 to 9 miles southeastward of Hardy Point, but are reported to lie farther southward. Rocks and reefs lie within 2 miles southeastward of Black Headed Rocks. A **wreck** lies awash on a small reef, about 15 miles eastward of Keppel Point.

Lights.—Range lights have been established at Tufi Harbor. The front light stands ½ mile 145° from the conspicuous white mark on the cliff on the northern side of the harbor, and is exhibited from a white cylindrical pillar. The rear light is exhibited from a white cylindrical pillar located 1.82 miles 308°30′ from the front light.

These lights in range lead through the reefs lying eastward and southeastward of Hardy Point, and about three-fourths of a mile to the southwestward of Veale Reef.

A light stands near Hall Point about 2½ miles north-northwestward of the white mark in Tufi Harbor. The light is exhibited from a white cylindrical pillar.

10–81 Maclaren Harbor, entered about 5 miles north-northwestward of Hardy Point, has a depth of about 35 fathoms throughout its entire length. Anchorage, perfectly sheltered from the wind and sea, has been taken in a depth of 32 fathoms, but the anchorage is not a good one on account of the depth. Small vessels, however, may obtain anchorage near the entrance.

Shallow water has been reported to extend off the eastern point of Maclaren Harbor. Otherwise deep water is reported to exist from 1½ to 2½ miles off prominent points in this region.

10–82 Cape Nelson *(8°59′ S., 149°15′ E.)* the northern extremity of the peninsula, is apparently steep-to in places, but there are numerous outlying reefs. The land within the cape consists of grassy slopes rising to the foot-hills of Mount Trafalgar.

The coast in the vicinity of the cape is broken by deep inlets resembling fjords, the scenery being exceedingly beautiful.

Off-lying Shoals.—Numerous shoals, on many there are depths of less than 6 feet, lie within several miles eastward, northeastward, and northward of Cape Nelson.

A reef is reported lying 8°42′ S., 149°32′ E., about 24 miles northeastward of Cape Nelson.

10–83 Approach to Cape Nelson from southward—Directions.—Approach must be made so as to raise the white mark on the northern shore of Tufi Harbor on a bearing of 309¾°. The white mark on this bearing is just open to eastward of a dark patch of

scrub on the skyline (the western of two such patches).

Veale Reef, lying about 11¼ miles southeastward of the front range light of Tufi Harbor, should be left three-fourths of a mile on the starboard hand.

The eastern edge of Tufi bluff (southern entrance point to Tufi Harbor) when raised will be found to lie in line with the white mark on the bearing 309¾°. The bluff is difficult to identify at a distance, but the two dark patches of scrub on the skyline are readily recognized.

Keep on the course 309¾° until the small island (about 9 feet high) close northward of Tufi bluff bears 321° (about 4.5 miles from the white mark); then alter course to 350° and then around Cape Nelson, keeping two miles offshore.

From Hardy Point to Porlock Harbor the bottom is irregular, with depths of 8 to 50 fathoms.

The range lights of Tufi Harbor in line 308½° can be used in place of the 309¾° bearing on the white mark.

10–84 Note.—A vessel reported the following observations:

Water was seen breaking on Veale Reef, but the Master reported that the land as seen from the vicinity of the reef is a dull shadow, and therefore bearings cannot be taken.

If the sun is in the west on a clear day, it is difficult to locate the Tufi Range.

When rounding Cape Nelson, the first recognizable object which could be used for taking bearings was Spear Island light structure.

Strong and unpredictable currents have also been reported in Cape Nelson area.

When navigating between Goschen Strait and Cape Vogel, vessels should be on guard for a possible northerly set.

After clearing Raven Channel, vessels should steer 302° so as to pass about 3½ miles northeastward of Cape Vogel. When the lighthouse on Ipotete Island is abeam, distant about 1½ miles; vessels should steer 306° until the Tufi Harbor Range Lights are picked up. Vessels should then steer as directed above to round Cape Nelson.

When westward bound, the best time to make Cape Vogel is during the daylight hours, and the best time to pick up the Tufi Harbor Range Lights is just after sunset when both the lights and the land are visible.

10–85 OUTLYING REEFS BETWEEN CAPE NELSON AND CAPE WARD HUNT.—The following reefs were seen by the officers of a surveying vessel when proceeding along the northeastern coast of New Guinea.

At 9 miles eastward of Hardy Point, the vessel passed through a belt of shallow patches extending as far as could be seen in a north and south direction, and about 3 miles wide.

A number of dangerous coral patches were met with northeast of Cape Nelson, 9 to 10 miles from the coast. When the vessel was in 8°54′ S., 149°24′ E., a patch, awash at low water, 200 yards in diameter, and having rock 2 feet high on it, was seen 400 yards to the northeastward. Coral patches were seen for 1½ miles southeastward of the above position, and for 3 miles to the northwest, and as far as could be seen from the masthead, toward Cape Nelson and Hardy Point.

When in 8°47′00″ S., 149°14′45″ E., coral patches with very little water on them were seen at 600 or 800 yards northward of the vessel, and were found to extend in a chain for 1½ miles westward.

When in 8°28′00″ S., 148°50′45″ E., the ship passed 600 yards southward of a reef

awash. Shallow water extended from it to the northward as far as could be seen from the masthead. Subsequently the vessel was anchored in 35 fathoms at 400 yards southwestward of a reef with a depth of 4 feet, in 8°21′00″ S., 148°46′45″ E.

Steering to the northwestward 6 miles from the above anchorage, the vessel appeared to gain the open sea, having passed several large patches, awash at low water; the outer patch seen bore 276°, distant 2 to 3 miles, when the vessel was in 8°17′00″ S., 148°44′45″ E.

The "P. D." of the charts in 7°48′ S., 148°34′ E., was passed close-to at noon, the weather being fine, but no shallow water was seen.

On the return voyage it passed 1 mile west of the reefs seen by d'Entrecasteaux, the vessel then being in 8°18′00′ S., 149°06′45″ E.

The same afternoon, when in 8°44′ S., 149°26′ E., a small coral patch with very little water on it was passed 800 yards distant, and another 2 miles southeastward of it.

Caution.—From this voyage of the surveying vessel along a portion of the northeast coast of New Guinea, it appears that the navigation is of the most dangerous character. The coral reefs are steep-to and seldom break. Between the coral reefs, which sometimes are only a few miles apart, a sounding of hundreds of fathoms may be obtained. The weather is often thick with passing squalls of rain, and anchorages are rare close to the land.

Vessels should therefore proceed with the utmost caution, keeping close to the land and anchoring at nightfall.

10–86 DYKE ACLAND BAY lying between Cape Nelson and Cape Endaiadere, 50 miles west-northwestward, is apparently deep; but the western coast has several offlying patches which lie as far as 6¾ miles from the coast, and this vicinity should be navigated with caution. Also two groups of coral patches lie northward of Porlock Bay, situated in the eastern part of the southern coast.

The shores of the bay are low, thickly wooded, and backed by a plain which extends many miles inland. The whole coast has no marked features, and the trees with which the plain is covered appear in the distance to be of the same height and color.

The coast, at the head of the bay about 40 miles westward of Cape Nelson, is backed by the foothills of the Hydrographer's Range. The Hydrographer's Range extends some 35 miles in a northwesterly direction and about 12 miles northwestward has a height of 5,000 feet. Behind this range, a mountain range rising to 9,000 feet follows the trend of the coast at a distance of 20 to 40 miles inland.

10–87 **Coast.**—There are several deep inlets in the coast between Cape Nelson and Collinson Point, 8 miles westward. Port Hennessy, situated about midway between them, is said to afford good anchorage. Between Port Hennessy and Collinson Point are the Spears islets, lying on the coastal reef which extends nearly 1 mile offshore. The spurs of the hills descending from Mount Trafalgar to this part of the coast have a gradual slope, and are covered with grass and scattered trees.

Sunken reefs lie from ½ to 1 mile offshore between Cape Nelson and Port Hennessy.

10–88 **Anasari Harbor** *(9° 01′ S., 149° 10′ E.)* is an islet situated 6 miles westward of Cape Nelson and immediately westward of Port Hennessy. The western side of the inlet is encumbered with shallow patches, with two islets on one of the patches. It is reported that fresh water may be obtained from the steam which flows into the head of the inlet.

Anchorage in a depth of 16 fathoms may be obtained off the mouth of the creek discharging into the eastern side of the inlet.

10–89 **Spear Islet—Light.**—Spear Islet is a small island lying on the reef extending one-half of a mile northward from the west-

ern entrance point of Anasari Harbor.

A light is shown from a white steel framework structure, 38 feet high, standing on the coast close southwestward of Spear Islet. The structure carries a white daymark, 6 feet square.

10–90 Collinson (Kanimeno) Point *(9° 00' S., 149° 06' E.)*, about 2¼ miles west-southwestward of Spear Islet, has a drying reef extending ½ mile offshore. A 7-fathom shoal lies about 1¼ miles northward of the point.

Several shallow patches, which are steep-to, are reported to lie 12 miles northwestward of Collinson Point; and several coral patches 6½ miles northwestward of the same point.

Shoals.—A 7-fathom shoal was reported to lie about 5½ miles northwestward of Spear Islet. Another 7-fathom shoal lies about 2¼ miles westward of the same island.

Tancred Rock, with less than 6 feet over it, lies about 10½ miles northwestward of Spear Islet.

Caution is advised when navigating in this area.

10–91 **Porlock Bay** lies between Collinson Point and the mouth of the Musa River, 10½ miles west-southwestward. The greater part of the shore is a network of lagoons, and the head of the bay is fringed with reef, extending more than ½ mile offshore.

Curtis Reef, awash at low water, lies 5 miles west-southwestward of Collinson Point and 2 miles offshore.

10–92 **Porlock Harbor**, indenting the coast for about 2 miles in a southeasterly direction, is entered between Okeia Point and Tamia Point. The two entrance points are 4¼ and 6 miles southwestward, respectively, of Spear Islet. There is a depth of 12 fathoms in the entrance. This depth gradually decreases and becomes shoal about 800 yards from the head of the harbor where a small river flows into it. The shores of the harbor are fringed with mangroves backed by hills, which rise to 750 feet on the eastern side and 650 feet on the western side. Drying coral reefs extend a short distance off the eastern shore and up to 100 yards off the western shore. Anchorage may be taken in depths of 8 to 12 fathoms.

Jones Reef, which dries, lies in the fairway of the entrance about 1,700 yards northward of Tamina Point. Foul ground extends a short distance off the northern side of the reef.

Okeia Point has foul ground extending slightly more than ¼ mile northward from it. About ½ mile southward of Okeia Point foul ground and a drying coral reef extending about 600 yards northwestward from shore form the northern entrance point of a small inlet. On the reef off the southern entrance point of this inlet is Stella Islet. A narrow passage exists between the islet and the shore.

Tamina Point has foul ground extending about ¼ mile northwestward from it. Between Tamina Point and Polaris Point, about ¾ mile east-southeastward of it, there is a cove with depths of 7½ to 10 fathoms. The shores of the cove are steep-to up to the edge of the fringing coral reef about 200 yards offshore.

The inner harbor is entered between Stella Islet and Polaris Point. The eastern side is steep-to up to about 100 yards from shore; the western is steep-to up to 150 yards from shore. A 9-foot shoal is located about 400 yards southeastward of Polaris Point. There is a jetty on the eastern side of the harbor about 1 mile southeastward of Polaris Point. A small stream is located close northward of the jetty and fresh water may be obtained.

10–93 **Musa River**, the eastern entrance of which lies 8 miles westward of Porlock Harbor, discharges into the sea by two mouths. The delta is low swampy land, as well as the coast for some distance eastward. The eastern mouth is 80 yards wide and has a depth of 14 feet; the western mouth is 300 yards wide and has a depth of only 3 feet on its bar. Both of these depths are possibly subject to change during the freshets. At times the water is discolored for some distance off the mouths. The river has been ascended only by boats.

Anchorage in depths of from 7 to 10 fath-