

5¾ miles eastward of the northeastern end of Fordate Island.

5-228 Nukaha (Schildpad Island), located 2 miles southeastward of Fordate Island, is an islet that lies near the western extremity of a drying reef 3½ miles long east and west and 2¾ miles wide at its eastern end; this reef is well marked by discoloration. The islet is 128 feet high and thickly wooded.

Wreck.—A stranded wreck lies on the northern side of the reef surrounding Nukaha Island.

5-229 Directions for the east coast of Jamdena.—Between December and March, the period when the winds of the northwest monsoon blow hardest, it is advisable for vessels proceeding from Orafroean Strait around Larat and thence southward to Egeron Strait to pass fairly closely along the east coast of Jamdena. From off the southern end of Larat Island set course to pass eastward of Sari Karmut and Sari Karmuta, the extensive detached reefs southward of the middle part of Larat, and thence to Watmoeri village, which is situated on a conspicuous point on the east side of Jamdena about 13 miles southward of the northeastern extremity of that island. Give the point on which Watmoeri Village stands a berth of at least 1 mile, and then keep about 1½ miles offshore as far as Egeron Strait. This course leads considerably to the westward of Sari Batsir, Sari Waturu, and Sari Kilmasa, which are parts of an off-lying chain of reefs that parallels the coast of Jamdena at a distance of 6 to 7 miles; the northernmost reef lies 7 miles southeastward of Watmoeri village, and the southernmost lies 11½ miles farther south-southwestward. In this chain of reefs there are drying reefs and reefs that have depths of 1 to 5½ fathoms over them. The only dangers between these reefs and the coast of Jamdena are a 2¾- and a 2¼-fathom shoal, located, respectively, 8¾ and 12¼ miles southward of Watmoeri village; these shoals are seldom marked by discoloration.

There is a depth of 5½ fathoms between the reefs. A broad reef projects from the eastern side of Asoetoeloen, an island off the southeastern extremity of Jamdena Island and on the north side of the eastern entrance to Egeron Strait. A broad reef projects from the eastern side of Asoetoeloen, an island off the southeastern extremity of Jamdena Island and on the north side of the eastern entrance to Egeron Strait.

Vessels with local knowledge can obtain anchorage off several of the villages between Watmoeri Village and Toember Village, 33 miles southward, during the northwest monsoon.

The Tambrian River discharges a stream of muddy water into an inlet about 20 miles north-northeastward of the southern end of Asoetoeloen Island. Much of this water flows through the channel between Jamdena and Mes Islet, situated 4 miles southward of the mouth of the river. This channel should, therefore, be used only when the water is clear and the reefs plainly visible.

Local attraction.—Near Aloesi village, situated on the east coast of Jamdena nearly abreast the southern end of Sari Kilmasa, there is a deposit of iron ore which causes local magnetic disturbances.

Shoal.—A 6½-fathom shoal lies about 2¼ miles eastward of Aloesi village.

5-230 Egeron Strait (B. A. Chart 2465), separating Selaroe Island from the southern end of Jamdena, presents no navigational difficulties. The islands and points of land are of use in passing through the strait. To vessels approaching from the westward the hill at the southern end of Anggarmasa (Angar Masa) Island, situated at the western end of the strait, is conspicuous. To vessels approaching the strait from the eastward the low Matkus (Matkusa) Island, located 2 miles within the eastern entrance to the strait, seems at first to be a part of Jamdena; it does not appear as an island until the vessel is within 5 miles of the strait. There is a coconut plantation on Matkus.

SAUMLAKI VILLAGE

Vessels coming from the westward approach with the north end of Anggarmasa bearing 090° ; when the hill at the southern end of the island is made out steer a southerly course until the hill bears 090° , then steer for it until it is about 3 miles off. Course should then be changed to pass through the middle of the channel.

Noestaboen (Nusa Tabor), a small islet located $1\frac{1}{4}$ miles northwestward of Matkus, lies on a bank which extends south-southwestward for a distance of about one-half of a mile and north-northeastward one-fourth of a mile; this bank is seldom marked by discolored water. Battjawat (Tikus) is a rock situated near the southern end of this bank. Vessels crossing the strait between Saumlaki Bay and Adaut Road should take the channel between Matkus and Battjawat.

5-231 Saumlaki Bay, near the eastern end of Egeron Strait, is a marked indentation in the south coast of Jamdena, Saumlaki Road, on the east side of the bay, affords safe anchorage at all times of the year.

A light is shown from a wooden pole at the head of the pier in Saumlaki Road whenever vessels are expected.

5-232 Saumlaki village, is located on the east shore of the bay. A pier projects out from the shore abreast the village to the outer edge of the shore reef. There is a depth of 16 feet alongside at the head of the pier.

Water may be obtained from a well about 220 yards from the shore. Vessels call regularly. There is a radio station at Saumlaki. The village was in ruins in 1946.

5-233 Adaut Road, situated on the south side of Egeron Strait at the north end of Selaroe Island, affords safe anchorage at all seasons; the preferred anchorage is near the pier. A shed with a galvanized iron roof, located at the head of the pier, is a good mark for entering and anchoring. A shoal with a depth of 26 feet lies in the northwest approach to Adaut Road. This shoal is located about 1 mile southeastward of Noe-

janat Island.

5-234 Adaut village, situated on the east side of the road, is the largest settlement on Selaroe Island. A stone pier juts out to the edge of the shore reef from the shore close northward of the village. Vessels call regularly at Adaut.

5-235 Selaroe Island ($8^{\circ}12' S.$, $130^{\circ}58' E.$), the northern end of which forms the south shore of Egeron Strait, is generally low; near the southern end of the island, however, there is a hilly ridge with a maximum elevation of 236 feet, and on the northwest coast, near Tanjong Wadatutu, there are some inconspicuous hills.

Vessels coming from the eastward and bound northwestward along the west side of the Tanimbar Islands may round the southwestern extremity of Selaroe at a distance of 1 mile and then set course to pass close southward of the southern end of Ariama (Riama), which is a low and very thickly wooded islet located $5\frac{1}{2}$ miles northwestward of the southwestern extremity of Selaroe Island. This course avoids the $5\frac{1}{2}$ -fathom shoal that lies 3 miles southwestward of the southern end of Ariama. The channel between Ariama and the reefs close off the west side of Selaroe is deep and clear of dangers.

5-236 Shoals.—A $4\frac{1}{2}$ -fathom patch and a $4\frac{3}{4}$ -fathom patch lie, in the western approach to Labuan Olendir, about $7\frac{1}{2}$ miles and 9 miles, respectively, west-northwestward of Tanjong Wadatutu. A $4\frac{3}{4}$ -fathom patch lies about $9\frac{1}{2}$ miles westward of the same point.

A $4\frac{3}{4}$ -fathom coral patch lies about 8 $\frac{1}{2}$ miles west-southwestward of the southwestern end of Selaroe Islands.

A $5\frac{1}{2}$ -fathom shoal lies about 3 miles eastward of the southeastern end of Selaroe Island.

A $4\frac{3}{4}$ -fathom patch lies about 10 miles eastward, and another lies about $13\frac{1}{2}$ miles

east-northeastward of the southeastern end of Selaroe Island.

A ridge, with $4\frac{3}{4}$ to $8\frac{1}{2}$ fathoms over it, extends parallel to the southeastern side of Selaroe between positions about 6 miles south-southeastward and 10 miles south-southwestward of the northeastern end of Selaroe Island.

Anchorage.—In addition to the previously described Adaut Road, located at the northern end of Selaroe, suitable anchorage is afforded by Laboean Lemian and Laboean Olendir, two bights on the northwest side of Selaroe, located, respectively, 12 and 18 miles northeastward of the southwestern extremity of the island. The anchorage in Laboean Olendir, off Namtaboeng village, eastward of Tanjong Wadatutu and the reef that extends northward 1 mile from that point, is particularly well sheltered against westerly and southwesterly winds. The coast reefs are usually well marked by discoloration.

5-237 Islands off the west coast of Jamdena.—Seira Island, located about 21 miles northward of the northwestern extremity of Selaroe Island, is separated from the west coast of Jamdena by a narrow, shallow channel which is used by proas. A broad reef, which is not very well marked by discoloration, extends southward and southwestward about $4\frac{1}{2}$ miles from the south side of Seira. On the western part of this reef, about 1 mile off the southwestern extremity of Seira, is Ngolin Island, which is remarkable in that its northern half is thickly wooded while the southern half is quite bare. About midway of the northwestern side of Seira Island is Wailutu village.

5-238 Bara Sadi, a drying reef located 8 miles west-southwestward of the southern end of Ngolin Island, can generally be sighted for a considerable distance by the surf on it.

Two $5\frac{1}{2}$ -fathom shoals lie about $8\frac{1}{2}$ miles southeastward and $6\frac{1}{2}$ miles south-southeastward, respectively, of the southern end of

Bara Sadi. Two 6-fathom shoals lie about $5\frac{1}{2}$ miles and $7\frac{1}{2}$ miles, respectively, southward of the same point. A depth of $7\frac{1}{2}$ fathoms, with deep water around, lies about 9 miles southward of Bara Sadi.

5-239 Jamdena Strait, which separates the west coast of Jamdena from the off-lying islands, is easy to navigate because of the numerous islands and headlands on which bearings can be taken. Inasmuch as the water in this channel is often murky, vessels must not rely on seeing the reefs or shoal water along it. Even the deep water of the strait is often discolored by mud stirred up by currents; on clear days when there are a few clouds in the sky the murky water is often given a very realistic discolored appearance by the shadows of the clouds.

5-240 Sukeler Island ($7^{\circ}38' S.$, $130^{\circ}57' E.$), located near the middle of the southern entrance to Jamdena Strait, $2\frac{1}{2}$ miles northwestward of the northwestern extremity of Seira Island, has an elevation of 138 feet and is a good mark for entering the strait. A drying reef extends about three-fourths of a mile west-southwestward from the western side of Sukeler. Near the outer end of this reef is Lengwati Islet. A $4\frac{1}{4}$ -fathom coral shoal lies $3\frac{1}{2}$ miles westward of Sukeler Island.

5-241 Seloe Island, located $7\frac{1}{2}$ miles northwestward of Seira Island, has, in its hilly western part, two conspicuous peaks, Amat Dawah and Woeroe Woeroe, 692 and 679 feet high, respectively. On the reef that projects northwestward 2 miles from the northwestern extremity of Seloe are several islets of which the largest is Nitu, 249 feet high; this islet is a good landmark. Off Nitu as well as off Tanjong Metanoean, the southwestern extremity of Seloe, there are sometimes strong tide rips that raise a heavy sea.

Tidal currents seaward of Seloe Island set northward and southward with a maximum strength of 2 knots. Observations taken in

Jamdena Strait during July and August and the first part of September showed a maximum drift of not more than 1 knot. Currents in the strait increase the discoloration of the water.

5-242 **Woeliaroe**, the largest of the islands off the west side of Jamdena, lies close northeastward of Seloe. It has several hills, the highest with an elevation of 617 feet, located near the center of the island, but appears to be more nearly flat than does Seloe. The numerous dangers, usually well marked by discoloration, around Woeliaroe practically preclude any possibility of landing on the island.

5-243 **Keswoe Island**, situated near the middle of Jamdena Strait, 4 miles eastward of the southern extremity of Woeliaroe, is probably of volcanic origin; it has a maximum elevation of 341 feet. Close eastward of Keswoe and separated from it by a comparatively deep channel is Wolas Island. In an area extending for a distance of 1 mile eastward and southeastward of Wolas there are numerous reefs, on some of which there are sandbanks and drying patches. The channel between Keswoe and Jamdena is deep and clear of dangers; close westward of Keswoe and Jamdena there is also a deep channel, a reef lies about $1\frac{1}{4}$ miles northwestward of the northern end of Keswoe Island. This reef lies on a bank that has depths of 3 fathoms, or less, over it and is part of the dangerous reefs that extend eastward from the southern extremity of Woeliaroe. An isolated drying reef lies $1\frac{1}{4}$ miles off the shore of Woeliaroe and about 3 miles northward of Keswoe; it is nearly always marked by discoloration.

Two detached drying reefs lie about $4\frac{1}{2}$ and 5 miles, respectively, west-southwestward of the southern end of Keswoe Island. A 1-fathom patch lies about 6 miles westward of the same point.

5-244 **Nus Taram** is comprised of three small islets on the mud bank that extends out from the shore of Jamdena, $4\frac{1}{2}$ miles northeastward of Wolas Island.

5-245 **Wotap Strait**, separating Woeliaroe and Wotap Islands, provides easy access to Jamdena Strait for vessels coming from the westward.

Jarngoer Roel and Jarngoer Raa are two well-wooded sandbanks that lie on separate reefs in the middle of the strait and are located, respectively, $1\frac{1}{2}$ miles south-southwestward and 2 miles southeastward of the southwestern extremity of Wotap Island; vessels may pass on either side of these sandbanks. On the southwest side of the strait are Natrool Island, 236 feet high, and Natraal Island, 171 feet high, located, respectively, one-half of a mile eastward and $1\frac{1}{2}$ miles east-southeastward of the eastern end of Woeliaroe Island. A $3\frac{3}{4}$ -fathom patch lies about one-half of a mile southeastward of the southeastern end of Natraal. A similar patch lies about one-half of a mile southeastward of the southeastern end of Jarngoer Raa. Foul ground extends a short distance northeastward from the northeastern end of Jarngoer Raa.

In 1957, the narrow channel between Natrool Island and the northeastern side of Woeliaroe was further restricted by the coastal bank off Natrool, which had extended about 250 yards.

Tidal currents set along the axis of the channels in Wotap Strait with a maximum velocity of 1 knot.

5-246 **Directions**.—The recommended channel through Wotap Strait is northward of Jarngoer Roel and Jarngoer Raa. Vessels coming from the westward should, after sighting the southwestern extremity of Wotap Island, steer for Jarngoer Raa on course 132° . When the remarkable rocky point with a rock close off it, located 1 mile southeastward of the 305-foot hill at the southwestern extremity of Wotap, bears 013° change course to 102° ; Jarngoer Raa will then be well open westward of Natrool. When Jarngoer Raa comes in range with the highest point of Natraal, bearing 218° , change course to 131° ; the rocky point men-

tioned above will then be almost dead astern. This course leads into Jamdena Strait.

Vessels using the channel that leads southward of Jarngoer Roeal and Jarngoer Raa steer in with these two islands in range bearing 097° until the western side of Natrool is in range with the eastern extremity of Woeliaroe, bearing 194°, and then change course to 127°. Keep on that course until the west extremity of Natraal comes in range with the east point of Wolas, bearing 196°, and then proceed on an easterly course into Jamdena Strait.

When the reefs can be made out, either of these channels can easily be navigated by the eye. A detached, partly drying reef, located about 500 yards south-southeastward of the rocky point mentioned above in the directions for the north channel, is almost always marked by discoloration. This channel is also subject to the same misleading discoloration of the water as is Jamdena Strait (sec. 5-239).

5-247 Wotap (Wotar) Island (7°20' S., 131°15' E.), lying on the western side of the northern entrance to Jamdena Strait, is hilly, with a maximum elevation of 620 feet near its center. On the western side of the island are two small bays that afford good anchorage.

5-248 Laibobar Island, situated 7¼ miles northeastward of Wotap Island, is very thickly wooded. At its northern end is a hill 512 feet high, but the 1,283-foot elevation at the southern end of the island dominates the entire Tanimbar group; on a clear day it can be seen from vessels off the east coast of Jamdena. The south side of the island is indented by a bay which affords good anchorage. Inasmuch as the coastal reef of this bay discolors well, there is no difficulty in entering. The channel between Laibobar and Oengar has a depth of 4¼ fathoms.

5-249 Oengar and Voelmali, located, respectively, ½ and 2½ miles southward of

Laibobar, are very thickly wooded. A reef on which there are several drying rocks lies within 1 mile east-northeastward of the northern end of Voelmali, but by proceeding closely along the southern end of Oengar a vessel can safely pass between the two islands.

Shoals.—A 1¾-fathom shoal lies about three-fourths of a mile north-northwestward, a 3¾-fathom shoal lies about 1½ miles north-westward, and a 4¼-fathom shoal lies about 1 mile westward of the northern end of Voelmali Island.

5-250 Boloe Island, lying close to the shore of Jamdena abreast the southern end of Laibobar, is low and wooded.

5-251 Mitak, on which there is a coconut plantation, lies ¾ miles east-northeastward of Laibobar Island; it is separated from the coast of Jamdena by a narrow channel which is made nearly impassable by many reefs. The reefs do not show up clearly because of the opaque water, and it is advisable to navigate with caution. On the south side of the island is a pier for small craft. A 2½-fathom shoal which does not discolor lies 2 miles westward of the southwestern extremity of Mitak, between that island and the northern end of Laibobar.

5-252 Karata and Kabawa are high, conspicuous islets, located, respectively, 1¾ miles northward and 2¼ miles north-northwestward of the northern extremity of Mitak Island.

5-253 Namwaan (7°07' S., 131°27' W.) and Itain Islands, situated 4½ miles northwestward of the northwestern extremity of Jamdena and 4¾ and 7½ miles, respectively, north-northeastward of the northern extremity of Laibobar Island are being cleared for coconut plantations and are, therefore, constantly changing in appearance. The two islands are, respectively, 495 and 420 feet high. The channel between

them is clear, but it is so narrow that it should be used only when the reefs along its shores are clearly visible. Depths of 6 fathoms or less extend over 1 mile westward and southwestward from the southern end of Namwaan Island. Depths of 10 fathoms or less extend about 2 miles farther southwestward.

5-254 Temar, a low, well-wooded, coral island, lies $1\frac{1}{4}$ miles southward of the southern end of Namwaan Island. Within a distance of 2 miles westward of Temar are two $5\frac{1}{2}$ -fathom spots; these shoals as well as the

reef around Temar do not discolor well.

Two reefs, over each of which there is a depth of only 3 feet, lie about 1 mile apart on a north-south line $2\frac{3}{4}$ miles eastward of Itain Island; these reefs show well.

5-255 Vatvoerat Islet is separated from the northeastern side of Namwaan Island by a clear deep channel about 650 yards wide. Off the southern end of Vatvoerat Islet are two rocks above water; the northern of these bears a striking resemblance to a Madonna and Child.

CHAPTER 6

ISLANDS OFF THE NORTHWESTERN EXTREMITY OF NEW GUINEA— NETHERLAND NEW GUINEA

6-1 NEW GUINEA.—A general description of New Guinea is given in chapter 1. Only the western part of that island, comprising Netherland New Guinea, is described in this chapter. Netherland New Guinea is divided into three districts, Northern, Western, and Southern New Guinea. Northern New Guinea, of which Menukwari is the capital, comprises the northern part of Netherland New Guinea from Tanjong Sele eastward, together with the adjacent islands, principally Waigeo, Batanta, and Salawati. Western New Guinea, with Fak Fak as capital, includes that part of the island that lies between Tanjong Sele, located southward of the southern end of Salawati, and Naurio Islet (sec. 6-174) together with the off-lying islands, including Misool. South New Guinea, of which Merauke is the capital, includes that part of the island lying between Tanjong Naurio and the Bensbach River.

6-2 ISLANDS NORTHWARD OF NEW GUINEA.—Helen Island and Tobi, as well as the other islands between New Guinea and the Palau Islands are described in H. O. Pub. No. 165A, *The Pacific Islands*, Volume I.

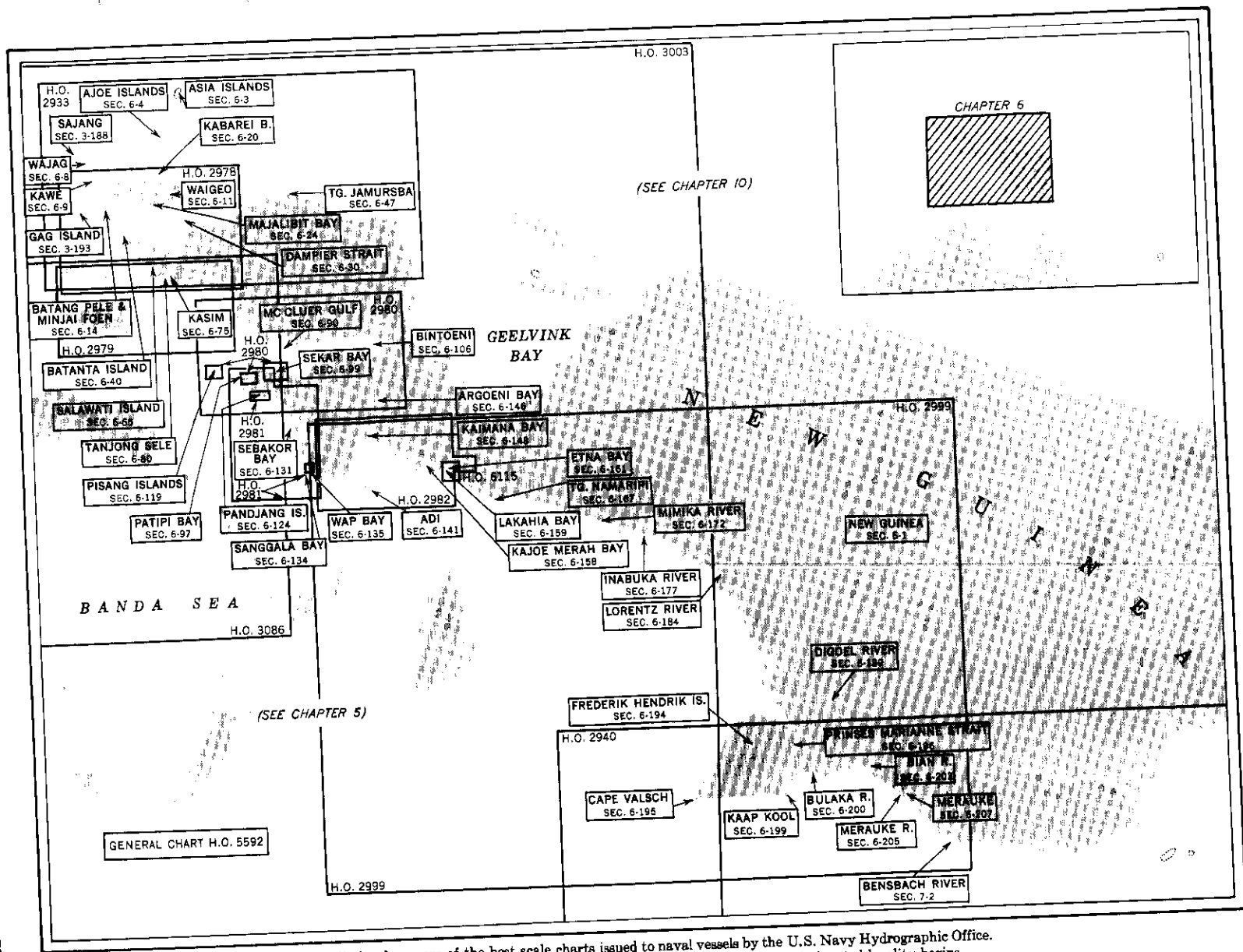
6-3 Asia Islands ($1^{\circ}05' N.$, $131^{\circ}15' E.$, *H. O. Chart 2933*), located about 105 miles northwestward of the Cape of Good Hope, northwest coast of New Guinea, consist of Fani, Igi, and Miarin Islands, all located on a narrow reef that is $6\frac{1}{4}$ miles long, north-northwest and south-southeast. The islands are low, but are covered with tall trees. The reef projects about one-fourth of a mile

northward from the northernmost island and 200 to 700 yards westward from the west sides of the islands. There are no anchorages in this group. The islands are uninhabited, but people from the Ajoe Islands sometimes come here to catch turtles. On the west side of Miarin, the southernmost island, is a pillar; a path leads about 220 yards from this pillar into the jungle to a fresh water well. The channel between the Asia and the Ajoe Islands is considered to be clear of dangers.

6-4 Ajoe (Aju) Islands (*H. O. Chart 2938*), located about 22 miles southward of the Asia Islands, consist of nearly 20 islets situated on two extensive reefs that are separated by a deep channel which is about 1 mile wide and clear of dangers.

Ajoe Island, the largest of the group, is located near the eastern end of the southern and smaller reef. The island, on which there are several villages, has a maximum elevation of 348 feet in its northwestern part. Oer Babo, two small islets located on the western part of the reef about 4 miles west-northwestward of Ajoe, are covered with coconut trees; neither of the islets is inhabited.

Mios Koean, the southernmost islet on the large northern reef, is a sandbank that is covered with coconut trees; at the southern end of the islet is a conspicuous plume-shaped tree, and off the northern end is a small shrub-covered islet. There is a village on Mios Koean. Mios Ros is a small, round, tree-covered islet located on the eastern edge



CHAPTER 6—GRAPHIC INDEX



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of the reef about three-fourths of a mile eastward of the northern end of Mios Koean.

In the central part of the northern reef is a lagoon which is entered through a narrow channel that leads in from the west side of the reef. On the northern side of the entrance to this channel is a group of black stones which cover for a short time during exceptionally high water. A vessel with a length of 180 feet and a draft of $11\frac{1}{2}$ feet has entered the lagoon. Temporary anchorage can be taken in the entrance to the channel but the current there is strong; a more secure anchorage, where there are no strong currents, is in a depth of 18 fathoms, just south of the inner end of the channel. The flood current in the entrance channel has a maximum strength of 5 knots; slack water is of short duration, especially during spring tides. Vessels proceed on sight of the reef, conning from aloft. Ordinarily the edges of the reefs are clearly visible, but there are several reefs and rocks along the channel; some of these dangers do not discolor well.

6-5 Abdon Island, located in the central part of the reef on the west side of the lagoon, has a maximum elevation of 295 feet. It has been practically stripped of trees and is used by the natives for the cultivation of a type of beet, one of their dietary staples. There are a few houses and coconut trees on the south side of the island. Reni and Roeton, situated northward of the lagoon about $5\frac{1}{2}$ miles northeastward of Abdon, are two low islands on which there are coconut plantations and a number of houses; in the central part of each island there is a conspicuous square tree. Kanobé, located on the northwestern part of the reef northward of the entrance to the lagoon, is 200 feet high and entirely covered with trees; it is not inhabited. Mios Mandoeng, lying $1\frac{3}{4}$ miles north-northwestward of Kanobé, is partly sandy and partly rocky; the sandy portion is covered with coconut trees among which are the houses of the inhabitants.

Awirisi, a group of above-water rocks, lie on the northern end of the reef about $1\frac{3}{4}$ miles east-northeastward of Mios Mandoeng.

Tides.—In the vicinity of Ajoe Island there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring lows of the two tides can coincide. As a result of this coincidence the lowest water level that can be expected, occurring in June or July and December or January, is 3.28 feet below the mean level. The maximum rise, occurring at all semidiurnal spring tides, is 2.3 feet above mean sea level. Sometimes the prevailing meteorological conditions are such as to cause the water to fall as much as 3.9 feet below mean sea level.

Currents.—While this area was being surveyed in 1928 the currents were observed to set strongly in a westerly direction, especially through the channel separating the two reefs of the Ajoe Islands; at that time there was no surf on the reefs. According to the natives, the northwest monsoon causes a prevailing easterly current which breaks strongly on the reefs.

6-6 Budd Islet, lying 20 miles northwestward of Ajoe Island, is low and covered with trees; it is not inhabited. The island was reported (1958) to be a good radar target up to a distance of 16 miles.

Caution must be exercised in approaching Budd Islet and the Ajoe and Asia Islands. When the sun is low, and when the sea is calm, the edges of the reefs can not be seen. Furthermore, the reefs rise so steeply that the lead gives no warning of approach to them. The edges of the reefs dry only at low water springs.

6-7 ISLANDS NORTHWESTWARD OF NEW GUINEA.—A chain of islands, the westernmost of which is Sajang (sec. 3-188), extends northwestward for a distance of 40 miles from off the western end of Waigeo Island.

6-8 Wajag (Wayag) ($0^{\circ}10' N.$, $130^{\circ}02' E.$ [redacted]), Stephanie, Quoy, Coquille, and Uranie, the other islands of this chain, are rocky and have an average elevation of about 650 feet. The islands are not inhabited, but the natives from Sajang and Ai sometimes come to these islands to catch turtles. The islands are so infested with mosquitoes as to make passage through the woods practically impossible. Around these islands are many small detached rocks. A 3-fathom spot that is marked by discoloration lies 1 mile southward of the south side of Wajag, and 1 mile farther southward is a $4\frac{1}{4}$ -fathom spot that does not discolor. At a distance of $1\frac{3}{4}$ miles southward of the southern extremity of Stephanie is a 5-fathom patch which discolors well. In the vicinity of these islands the tidal currents, particularly during spring tides, are strong.

The channel between these islands and Kawé is wider and easier to navigate at night than is Bougainville Strait, the passage southeastward of Kawé. Deem, a small, round, wooded islet, 171 feet high, located on the southern side of the western entrance to this channel, $1\frac{1}{4}$ miles off the northwestern extremity of Kawé, is a good landmark. Two rocky patches that are barely above water lie about three-fourths of a mile off the north coast of Kawé at respective distances of $2\frac{1}{4}$ and $3\frac{3}{4}$ miles eastward of Deem; they usually break. Currents run through the channel with considerable strength. Strong tide rips are frequently encountered westward of Deem.

Vessels using the passage between Wajag and Kawé should, when approaching from the westward, steer for the southeast point of Uranie Island on an 081° bearing. When the northeast point of Kawé Island bears south, course may be altered to east. Do not approach Kawé Island to within $2\frac{1}{2}$ miles.

6-9 Kawé ($0^{\circ}04' S.$, $130^{\circ}08' E.$ [redacted]), the largest island northwestward of Waigeo, is of very irregular outline. Its northern part is heavily wooded, but the

reddish-colored hilly southern section is sparsely wooded. The maximum elevation of the island, located near the center of the main part, is 2,352 feet. Two inlets penetrate the east side of the island for a distance of $1\frac{3}{4}$ miles. Several rocky islets lie off the eastern side of Kawé. Beo Islet, about $1\frac{1}{4}$ miles southeast of the easternmost extremity of Kawé, extends in a southeast direction into Bougainville Passage, with a reef at its outer extremity. Balabalak Island, lying $1\frac{1}{4}$ miles westward of Kawé, has several low, grass-covered hills; between the two islands there are several rocks.

6-10 Bougainville Strait, between the northwestern coast of Waigeo and Beo Islet, is generally deep, but at its western end are several shoal patches among which are a 5-fathom and a $3\frac{3}{4}$ -fathom shoal; the two shoals lie, respectively, 8 miles southwestward and 9 miles south-southwestward of the summit of Kawé. Farther eastward, on the northern side of the channel 5 miles northeastward of the $3\frac{3}{4}$ -fathom patch and $4\frac{1}{2}$ miles southward of the summit of Kawé, are two above-water rocky patches. The tidal currents running over the uneven depths in the channel cause strong overfalls and eddies. In the narrower parts of the strait the tidal currents frequently attain a velocity of 3 knots. The best route for vessels to follow in coming to Bougainville Strait from the southward is through the channel between the islands of Ju and Minjai Fun.

Vessels coming from the westward should, after leaving the strait between Gebe and Joe and in a position about 4 miles south of Joe, steer straight for the summit of Batang Pele Island on a course of about 104° . This course will lead about 3 miles south of the $3\frac{1}{4}$ -fathom shoal south-southwestward of Kawé. Thence alter course to 054° , steering for the high Mé Island. On this course Cape D'Entrecasteaux is approached to about a mile. When the cape is abeam, steer 036°

for the highest Seprang Islet. Pass south of these rocky islets and north of Loh Loh.

6-11 WAIGEO ISLAND, lying 25 miles off the northwest coast of New Guinea, has a length of 68 miles, east and west, and a maximum width of about 26 miles. It is composed almost entirely of hills and mountains which rise steeply from the sea; the highest elevations are on the north side of the island. Buffelhoorn, a 3,143-foot elevation about midway of the north coast of the island, is a good landmark, as is also Serojil (Serodjil), a mountain 3,081 feet high, located 14 miles farther westward. Majalibit Bay, which is entered on the south side of the island, nearly divides Waigeo into two parts. The island, which is covered with a dense forest, has a hot and moist climate.

The only place on the island that is visited frequently by vessels is Saonek Anchorage, situated about midway of the south coast of the island. The only place where good water can be obtained is in Fofak Harbor, on the north side of the island.

The west and southwest coasts of Waigeo are rocky and extremely irregular in outline and are characterized by numerous moderately high mountains of peculiar shape. Groote Tafelberg, the highest elevation in the western part of the island, located 12 miles eastward of Tanjong Sel Pele, the western extremity of Waigeo, is 1,595 feet high. Waisilip, 1,017 feet high, located $1\frac{3}{4}$ miles east-southeastward of Groote Tafelberg, is conspicuous when seen from the southwestward. Kasteelberg, 1,070 feet high, situated $5\frac{1}{2}$ miles eastward of Waisilip, is hard to make out, but when identified is a good mark.

The 100-fathom curve off this coast is very irregular and extends in a general south-southeasterly direction to the southern side of Batanta Island, about 30 miles southward of Waigeo. Within this curve are numerous islands and reefs.

Between Gam Island and Tanjong Manaré ($0^{\circ}16'S.$, $130^{\circ}19'E.$), which is situated 7 miles east-southeastward of Tanjong Sel Pele, the southwest coast of Waigeo forms a large bight. In the northeastern part of this bight is Waisai Bay, and in its southeastern part is Warparim Bay, an indentation in the north shore of Gam; both of these bays afford good anchorage and, except for the reefs and shoals close along their shores, are clear of dangers. A channel close along the shore of Waigeo eastward of Tanjong Manaré leads to Waisai Bay, and close around the northwestern extremity of Gam is a channel that gives access to Warparim Bay.

Vessels must exercise caution in navigating these channels as well as those among the islands in the bight. *H. O. Chart 2978* is essential in navigating this area. On the shores of the bight there are only two small villages, Waisai, located at the head of Waisai Bay, and Waiwum (Waiwoom), situated on the shore of Waigeo eastward of Gemien, an island situated close off the shore 6 miles northward of the northwestern extremity of Gam Island; anchorage can be taken off both these villages.

6-12 Directions—Warparim Bay.—Vessels bound for Warparim Bay can approach Pef Island and Tanjong Ombrab closely.

Leaving the bay and bound northwestward, an inner fairway can be followed. Keep the summit of Biantsji Besar in range $307\frac{1}{2}^{\circ}$ with the middle of Peniki Island. When the eastern point of Jeben (Yeben) Island bears $220\frac{1}{2}^{\circ}$, alter course to 349° for Tanjong Waisai. Approach the latter point until Tanjong Manaré bears 280° , thence steer 280° until the peak of Biantsji Besar is abeam, whence course is altered for the northern point of Ronsoear bearing $258\frac{1}{2}^{\circ}$. When Manaré Islet is passed, the archipelago can be left for Bougainville Strait without further difficulty.

6-13 Waisai Bay.—Vessels approaching from Bougainville Strait should steer 120° for the peak of Biantjsi Besar. When Manafé Islet is abeam steer for the southern point of the headland north of Biantjsi Ketjil until Biantjsi Besar peak bears 189° , whence course is altered for the hilltop on Gemien Island bearing 102° . A sheltered anchorage can be found north of Gemien Island behind the small island lying off the north coast of Gemien.

Vessels approaching Waisai Bay from the southwestward should steer for the northwestern point of Gemien Island bearing 050° .

A shoal of $5\frac{1}{2}$ fathoms was reported (1962) a little more than 8 miles west-southwestward of Biantjsi Besar peak.

6-14 Off-lying islands.—Between Tanjong Sel Pele and the large hilly island of Gam there are a great many small islands and rocks. Among the larger of these islands are Batang Pele and Minjai Fun, located, respectively, $4\frac{1}{2}$ and 7 miles southward of Tanjong Sel Pele. Batang Pele may be identified by its 1,207-foot summit. Ju Island, situated $1\frac{3}{4}$ miles westward of Minjai Fun and separated from it by a deep channel, is low. Two shoal patches, over which there are least depths of $3\frac{3}{4}$ and $5\frac{1}{2}$ fathoms, lie, respectively, $2\frac{1}{2}$ and $1\frac{3}{4}$ miles northwestward of Ju. Outside the 100-fathom curve and $5\frac{1}{2}$ miles south-southwestward of the southern end of Ju is a 5-fathom shoal. Southeastward of these islands is a group of small, low, coral islands, among which are Fwojo, Meos Arar, Jef Tsiep, and the Mutus Islands. Another group of islands lies northeastward of the Mutus Islands; one of these, Biantjsi Besar, has a conspicuous peak 446 feet high.

In 1950 it was reported that the drying reef on the northern side of Biantjsi Besar had extended about 550 yards from the shore. Vessels should avoid passing between Biantjsi Besar and the adjacent islets.

Gemien Island, located eastward of the last mentioned group, close to the shore of Waigeo, has a number of hills with a maxi-

mum elevation of 741 feet; these hills aid in identifying it at a considerable distance. Jeben and Apibok are two small rocky islands situated $5\frac{1}{2}$ miles west-northwestward of the southwestern extremity of Gam; a drying reef lies between the two islands, and a number of rocks extend out southwestward from the western end of Jeben. A depth of $1\frac{1}{4}$ fathoms was reported about 1 mile westward of the west end of Jeben.

On the north side of Minjai Fun and the south shore of the channel that separates that island from Batang Pele is the only permanent village on the islands mentioned above. There is anchorage in a depth of $13\frac{1}{2}$ fathoms, sand, off the village. The anchorage may be reached either from the eastward or westward by proceeding along the shore of Minjai Fun at a distance of 220 yards.

Tides.—At Mutus Besar, the eastern of the Mutus Islands, located 7 miles eastward of Minjai Fun, there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring highs of the two tides can coincide. As a result of this coincidence the highest water level that can be expected, occurring in May or June and November or December, is about 2.3 feet above mean sea level. The lowest level that can be expected is 1.3 feet below mean sea level.

6-15 Aljui Bay ($0^\circ 10' S.$, $130^\circ 18' E.$), which penetrates the western end of Waigeo for a distance of nearly 12 miles, is very irregular in shape. In the entrance to the bay there are three large and several small islands; there are two entrance channels, one northward and the other southward of this group of islands. Cape D'Entrecasteaux is the western extremity of the small westernmost island of this group. Tanjong Sel Pele, the southern entrance point of Aljui Bay and the western extremity of Waigeo, is backed by a conspicuous 1,394-foot hill. The southern entrance, between Cape D'Entrecasteaux and Tanjong Sel Pele, is narrowed to some extent by a drying reef that projects about 1,200 yards northwestward from the latter point and by a $2\frac{1}{4}$ -fathom shoal on the north

side, but the channel itself is clear. In the northern entrance channel there are two $3\frac{1}{4}$ -fathom patches, and, farther in, a $7\frac{3}{4}$ -fathom shoal.

The inner part of the bay consists of a number of irregular arms that are almost landlocked; the channel leading from the outer to the inner bays is divided into two narrow passages by a long narrow island. The northern passage has a least width of about 435 yards and a least midchannel depth of $6\frac{1}{2}$ fathoms; the southern passage is wider at its western end and has the same least depth as the northern passage, but a number of rocks lying at its eastern end restrict its width considerably. A $2\frac{1}{2}$ -fathom shoal lies about one-fourth of a mile northward of the small island in the center of the lower inner bay. The shores of the outer bay are steep and rocky, with sandy patches in places. The chart is a sufficient guide for entering the outer bay. Except for the small village of Sel Pele, near the point of that name at the southern side of the entrance to the outer bay, and another village on the northern entrance, there are no inhabitants in the vicinity of the bay.

6-16 Directions.—The southern entrance, between Cape D'Entrecasteaux, and Tanjong Sel Pele, is by far the easiest one: Enter the bay by steering a course of 098° with the southernmost of the small Aljui Islets in range with the southern point of the southernmost of the islands that lie in the entrance to Aljui Bay. This point may be closely rounded. The Aljui Islets are the chain of small islets lying close off the western part of the long unnamed island which divides the entrance to the inner bays into two channels.

The inner bays are reached either by the passage north of the long unnamed islands or by the passage south of it. The latter is a long winding channel with a least depth of $6\frac{1}{2}$ fathoms in midchannel. There are no off-lying reefs. The eastern end is about

435 yards wide in the fairway.

Vessels using the northern passage should steer 095° for a small islet northeastward of the long unnamed island. As soon as the northeast point of the long unnamed island bears 135° , alter course hard to starboard for that point for not over 110 yards, thence turn hard to port, setting course for approximately 104° midway between that point and the small islet mentioned above.

Vessels leaving by the northern passage should keep in the middle of the passage between the northeastern point of the long unnamed island and the small islet northeastward of it, on course 284° . Straight ahead is a small hilltop on the 814-foot large island at the outer part of the bay. This hilltop is south of and is somewhat lower than the 814-foot summit. When the northeastern point of the long unnamed island, forming the southern side of the northern passage, bears 135° turn hard to starboard on a course of 315° . Follow this course for about 110 yards, then turn hard to port and proceed on a course of 275° with the small islet that lies in the northern entrance to the inner part of the bay and northeastward of the long unnamed island, mentioned above, bearing 095° astern. A vessel following these directions will find depths of at least 10 fathoms.

From the inner bay a deep and clear passage leads into the spacious North Bay. The middle inlet of North Bay reaches to within 550 yards of the head of Saripa Bay on the north coast of Waigeo.

Anchorage.—The outer part of the bay affords anchorage in 23 to 30 fathoms. The inner part of the bay and the bay northward of it afford excellent anchorage, in 14 to 18 fathoms.

6-17 Mé Island, lying off the northwestern extremity of Waigeo $1\frac{1}{2}$ miles northwestward of the northern entrance to Aljui Bay, has an elevation of 764 feet. Drying reefs extend off the several points of the

island. A clear passage leads between Mé and Waigeo, but there are frequently heavy tide rips in its narrowest part. A drying rock lies three-fourths of a mile northward of Mé, and close northward of the rock is a reef over which there is a depth of about 1½ feet.

6-18 North coast of Waigeo.—Except for the shores of the bays this coast is very rocky; in some places the hills rise almost vertically from the water's edge. Most of the inlets along the coast afford suitable anchorage; the most sheltered of these is Fofak Harbor. Between Hoek Lamarche, the northeastern extremity of the island, and Tanjong Saobas, situated about 10 miles northwestward of that point, there are no anchorages. This stretch of coast is low but is backed by rather high hills. Hoek Lamarche is low but can be recognized by Mt. Pupri, 860 feet high, located close southward of the point. The more conspicuous elevations along this coast have been described in section 6-11.

The winds of the southeast monsoon frequently blow with a force of 7 or 8 over the mountains along this coast, but they attain their full strength only during part of the night and in the forenoon.

The principal inlets between the western end of the island and Fofak Harbor are Mané Tep, Saripa, and Arago Bays, and Telok Wunoh. Mané Tep Bay is an open bight eastward of Mé Island. Telok Wunoh, separated from Mané Tep Bay by a steeply rising tongue of high land, is an open inlet; it is fronted by Wunoh Island, 349 feet high, near which are a number of rocks, some above water.

Saripa Bay, situated 5½ miles eastward of Mé Island, is a large inlet that penetrates the island for a distance of 3½ miles and, with the northern arm of Aljui Bay, cuts nearly through the western part of the island. On the north side of the entrance is Sipsipa Islet from which a reef with rocks on it extends northwestward for a distance of three-fourths of a mile; a similar reef extends about 700 yards in a northwesterly direction from the eastern entrance point of

the bay. Near the head of the bay are some small islets with reefs extending off them. There is a village on the west side of Saripa Bay about ½ mile south of the west entrance point. Another village is located at the head of a small inlet on the east side of the bay, about 1½ miles south-southeastward of the east entrance point. Arago Bay, 11 miles eastward of Saripa Bay, is open to the northward; in its southern part there are two inlets. About midway between the entrance points is an island from the eastern side of which a reef with several rocks on it extends eastward about 600 yards. Schun Island lies off the western entrance point of the bay.

Off-lying dangers.—The Seprang Islets, the highest and westernmost of which attains an elevation of 125 feet, lie on the west side of the northern entrance to Bougainville Strait, 5½ miles north-northeastward of Mé Island. Loh Loh (De Knoopen) consist of six small rocky islets located 6 miles eastward of the Seprang Islets. Both of these island groups are good landmarks.

6-19 Fofak Harbor ($0^{\circ}02' S.$, $130^{\circ}44' E.$), situated about 28 miles from the western end of Waigeo Island, about midway of the north coast of that island, is a roughly rectangular basin that lies approximately parallel with the coast. About 450 yards off Rotsige Hoek, the eastern entrance point, is a drying reef on which are a number of rocks. About one-half of a mile southward of this point are the Lélédé Rocks which extend out nearly 600 yards from the east side of the entrance channel. Midway between Rotsige Hoek and Hoek Forrest, the western entrance point, is an 8-fathom patch. The entrance channel has a least width of about 600 yards and depths of 20 to 30 fathoms. A reef, on which there is an islet, projects northwestward 800 yards from a point on the south shore of the bay facing the inner end of the entrance channel. On the north shore of the bay, about 1 mile eastward of the inner end of the entrance channel, is a waterfall where boats equipped with about 90

yards of hose can take on good fresh water; They can approach the shore to within a few yards abreast the waterfall. A village at which there is a mosque lies at the head of the eastern part of the bay. A wide mud bank fronts the village.

Off-lying Islands.—Manuran Island situated about 10 miles east-northeastward of the entrance to Fofak Harbor and $1\frac{1}{2}$ miles off the coast of Waigeo, has a flat central summit 978 feet high. A $2\frac{3}{4}$ -fathom reef lies about three-fourths of a mile southward of the southeastern extremity of the island.

Lawak Island, 623 feet high, is located 3 miles southeastward of Manuran. A channel with depths of 7 to 9 fathoms and with a navigable width of about 400 yards between the reefs on either side separates Lawak Island from Waigeo.

6-20 Kabarei Bay, lying southeastward of Lawak Island, affords anchorage in almost any desired depth during the southeast monsoon. There is a village on the southeast shore of the bay.

Directions.—Vessels approaching Kabarei Bay from the westward can proceed through the wide and safe passage between Waigeo and Manuran Islands, avoiding the $2\frac{3}{4}$ -fathom reef southward of the latter. Keep to the Waigeo shore to the narrow passage between Lawak and Waigeo. When the narrow elbow of this passage is passed bring the southern point of Lawak astern bearing 253° . Proceed on this course, 073° , until the eastern point of Lawak is abeam, thence alter course to starboard for the anchorage in Kabarei Bay. A good anchorage for small vessels is in $3\frac{1}{4}$ to 4 fathoms eastward of the three islets at the head of the bay.

6-21 Boni Harbor ($0^\circ 03' S.$, $131^\circ 03' E.$).—At Tanjong Wariai, situated $5\frac{1}{4}$ miles eastward of Lawak Island, the coast line turns sharply to the southward for a distance of $2\frac{1}{2}$ miles and then, forming a right angle, turns again to the eastward. Fronting the bight thus formed is Boni Island, low but covered with high trees. A wide drying reef projecting eastward $1\frac{1}{4}$ miles and northwestward

$1\frac{1}{2}$ miles extends out from the east and north sides of the island. There is a village on the northwestern side of the island.

Bombédari Islet, from which a drying reef extends northward about one-half of a mile, lies nearly $1\frac{1}{2}$ miles southeastward of Boni Island. There is a wide channel on the west and south sides of Boni, but the latter, entered from the eastward, between Boni and Bombédari, is the better channel. This channel affords good anchorage over a bottom of mud and sand. In the harbor, about one-half of a mile southward of Boni Island, there is an area in which there are numerous reefs and rocks. A channel separates Bombédari from the shore of Waigeo, but in it are a number of dangerous boulders.

A 3-fathom shoal lies close inside the 100-fathom curve 3 miles north-northwestward of Tanjong Wariai.

6-22 **Directions.**—Vessels approaching Boni Harbor from the north-northwestward should keep to the Waigeo side of the fairway. When west of Boni Island keep in mid-channel and proceed to the anchorage south of Boni. To leave to the eastward bring Bombédari Island ahead bearing $113\frac{1}{2}^\circ$. When the eastern side of Boni Island bears 349° turn to port and steer midway between the great drying reefs.

Vessels approaching from the eastward should bring the southern point of Boni Island ahead bearing west. Steer west until Bombédari Island (middle) bears 205° , whence a course of 255° may be steered.

6-23 **The south coast of Waigeo**, between Tanjong Imbikwan, the southeastern extremity of the island, and the southwestern extremity of Gam Island, is indented by two large bays, Majalibit and Kabui. A chain of reefs, shoals, and small islets, lying close to the 100-fathom curve and paralleling the coast at an average distance of about $2\frac{1}{4}$ miles, extends from the eastern end of Mansuar Island, southward of Gam, to a position abreast Tanjong Imbikwan and thence northeastward to Tanjong Momfafa, $7\frac{3}{4}$ miles northeastward of Tanjong Imbikwan.

Shoal patches of $3\frac{1}{2}$ to 5 fathoms lie within the 100-fathom curve up to 7 miles eastward of Tanjong Momfafa, the east extremity of Waigeo. It was reported (1959) that depths in the vicinity of the $3\frac{1}{2}$ -fathom patch were less than charted. Between this chain of dangers and the coast of Waigeo there is a deep channel which can be used when the reefs and shoals can be made out; the preferred course on this inside channel leads close along the shore. Off the entrance to Majalibit Bay there is an opening in the off-lying reefs; close inside this opening is an unmarked 2-fathom spot which seldom, if ever, discolors. Abreast Wakré village, $5\frac{1}{2}$ miles west-northwestward of Tanjong Imbikwan, the off-lying dangers recede toward the shore to such an extent as to make it absolutely necessary for vessels to be able to see the reefs; a stone, which can not always be seen, lies three-fourths of a mile southwestward of Wakré village.

Memjai Islet, located $3\frac{1}{2}$ miles westward of Tanjong Imbikwan, consists of a 440-foot wooded hill which is a good mark for entering the inner channel through the opening west-southwestward of that islet. Wajam (Wajim) Islet, situated about 1 mile southward of Tanjong Imbikwan, is quite low, but is, nevertheless made conspicuous by its high trees and is a good mark for vessels rounding the east side of Waigeo. Tanjong Imbikwan, which is backed at a distance of $1\frac{1}{2}$ miles by a 1,608-foot elevation, is also conspicuous. Directions for this inner channel are given in section 6-32.

6-24 Majalbit Bay (entrance $0^{\circ}21'S.$, $130^{\circ}56'E.$), which is entered from the south coast in a position 18 miles westward of Tanjong Imbikwan, extends in a northwesterly direction nearly across Waigeo Island and reaches to within $1\frac{3}{4}$ miles of Fofak Harbor, on the north coast. Tidal currents and tide rips in the entrance are very strong, and vessels more than 300 feet in length are advised not to attempt entry. It is advisable to wait for the turning of the tide before entering. The tide turns 3 hours before or after high water at Saonek. The currents in the narrows run with a maximum velocity of 5 knots, and

in the wider, southern part, a current of 3 to 4 knots has been recorded. In the narrow parts eddies are formed, and along the shores counter-currents are to be met with. Vessels are advised to anchor first before entering and then to proceed after personal observation of the current. Outside the entrance of the bay the largest difference of tidal levels is reported to be about $6\frac{1}{2}$ feet.

According to local information rains often occur in August and September. During these months the mountains are often clouded.

6-25 Directions.—The following general directions should be of assistance in traversing the channel through the strait.

A mid-channel course, of about 308° , should be steered for the first mile of the strait. The point on the east side of the channel, about 2 miles northwestward, should then be brought into line with the point beyond it on the opposite side of the channel, bearing 330° ; and kept in line for another mile. The west shore should be followed, at a distance offshore of about 200 yards, until the point on the east side is abeam. A mid-channel course should then be held for about $\frac{1}{2}$ mile to, and through the narrows, which are less than 200 yards wide, and where the strait turns abruptly westward. Having passed the narrows, the channel is clear of shoals to Pulau Manil.

The depths in the bay gradually shoal towards its head, and in general there are depths of 5 to about 13 fathoms over the greater part within the entrance. The entrance itself is less than 200 yards wide in the fairway in places, and is quite tortuous, but the depths are 6 fathoms or over along the recommended track. It is reported that a vessel drawing $19\frac{1}{2}$ feet can proceed to nearly all parts of the bay. The bottom consists chiefly of soft mud. The only important off-lying dangers are a 1-fathom shoal and a $4\frac{1}{4}$ -fathom shoal lying about three-fourths of a mile eastward and $1\frac{3}{8}$ miles east-southeastward of the western entrance point of the bay. A reef, surrounded by shoal water, lies about $2\frac{1}{4}$ miles inside the entrance, on the east side of the channel.

Entering vessels are advised to use the

passage northward of Pulau Manil, a 351-foot islet about 4 miles within the entrance. Near here a moderate speed should be maintained in order to overcome the effects of the current. After passing the narrows in the vicinity of Pulau Manil a vessel should give a wide berth to the northwestern point of that islet when the tide is setting out. Thence navigation does not offer further difficulties.

Vessels leaving the bay are advised to shape a course southward of Pulau Manil.

Small vessels intending to anchor in the vicinity of the village of Pitsjor, one-half of a mile southward of Pulau Manil, should first pass north of Pulau Manil, thence turn around that islet and pass between it and the eastern end of Poelau Waiwah, and then proceed to the anchorage.

A sunken rock, dangerous to navigation, lies $2\frac{1}{2}$ miles northward of the northwest of the northwest extremity of Poelau Waiwah.

The narrow Moeloe Bajong, which separates Poelau Waiwah from the coast southward, is recommended for only shallow-draft vessels. A river which discharges into the middle of this passage frequently carries trees into the fairway, causing obstructions to navigation.

6-26 Saonek Anchorage (*H. O. Chart 2938*).—Saonek Ketjil and Saonek Besar are two islets that lie off the south coast of Waigeo about $11\frac{1}{2}$ miles southwestward of the entrance to Majalibit Bay. Saonek Ketjil, the smaller and northeastern islet, is wooded and has an elevation of 233 feet. Saonek Besar is a well-wooded islet with a 148-foot elevation near its southeastern end and a village on its northwestern side; the islet is fringed by a drying reef which extends out nearly 450 yards from its southwestern side. A reef, over which there is a depth of $1\frac{3}{4}$ fathoms, lies $1\frac{1}{2}$ miles northwestward of Saonek Besar. This reef as well as the reef that fringes Saonek Besar is marked by discoloration. A shoal, with a least depth of 2

fathoms, lies about 3 miles eastward of Saonek Besar.

Anchorage can be taken in a depth of 16 fathoms, sand, northwestward of Saonek Besar, on the extension of the axis of the main pier at the village. Vessels may anchor closer to the island, but the tidal currents are strong; for that reason it is advisable to run a line to the shore if anchoring in this inner position.

Tides.—Currents.—At Saonek Anchorage there is both a diurnal and a semi-diurnal tide, but the latter predominates. The spring highs and the spring lows of the two tides do not coincide. The maximum rise and fall that can be expected are, respectively, about 2.0 feet above and 2.0 feet below the mean sea level.

Strong currents may be encountered around the island.

6-27 Saonek Village, located on the beach on the northwest side of Saonek Besar Islet, is the only place of any commercial significance around Waigeo Island. Products of the jungles of Waigeo and shells and trepang from the adjacent islands are collected at Saonek for exportation. Fronting the village are two small boat piers and a larger pier for sailing craft.

6-28 Kabui Bay is a wide inlet in the south coast of Waigeo northwestward of Saonek Anchorage. Gam Island closes off the greater part of the otherwise open section of this inlet. Eastward of Gam is an entrance channel $1\frac{3}{4}$ miles wide. The island of Ura, located 2 miles inside the entrance to the bay, is 413 feet high. The channel westward of Ura is safe and deep. Vessels may encounter strong currents in the entrance channel. Anchorage can be taken anywhere in the bay. Mjanef Islet, located in the northeastern part of the bay, fronts Sesil Bay, a small, comparatively shallow arm of Kabui Bay. There are several small villages in the vicinity of Kabui Bay; among these are Ura, located on the islet of that name, Warai, located on the north side of Mjanef Islet, and Menjaifun, located on the north shore of Kabui Bay.

Kabui Strait, separating Gam and Waigeo Islands, leads from Warparim Bay into the southwestern part of Kabui Bay; this strait is of no navigational importance.

6-29 **Gam Island** ($0^{\circ}30' S.$, $130^{\circ}35' E.$, *H. O. Chart 2978*) has high steep coasts. On the island are several high hills, the most important of which are a 1,329-foot elevation situated 3 miles westward of Tanjong Jenanas, the eastern extremity of the island, and another hill 971 feet high with a lower peak on its southern side, located $3\frac{1}{2}$ miles southwestward of that point. These two hills are good landmarks when seen from the east and southeast. The island is not very conspicuous when seen from the southwestward. Close off the eastern end of the island are two inconspicuous islets, Friwin and Friwinbonda, each 33 feet high. Camphuis Islet, lying 2 miles southeastward of Friwinbonda, is 138 feet high, rocky, and covered with vegetation. Kerupiar, a rock about 33 feet high, lies close off the coast of Gam $2\frac{1}{2}$ miles southwestward of Friwinbonda. In the channel between Gam and Mansuar Island there are several reefs and shoal spots which do not discolor well; tidal currents in this channel are strong. The small bays on the south and west sides of Gam can be used only by small vessels. Off the southwestern extremity of Gam is Jangelo Islet; a 2-fathom patch lies one-half of a mile westward of Tanjong Ngan, the western extremity of that islet.

6-30 **DAMPIER STRAIT**, lying between Waigeo and Batanta Islands, has several channels. The main channel leads close southward of Mansuar, Kri, and Koh Islands and northward of Augusta and Duiven Islets. Another channel leads along the southern side of the bank on which the two latter islets lie, and a third channel lies between the north side of Batanta and the chain of reefs and islets to the northward. A bank of

soundings extending across Dampier Strait connects Batanta and Waigeo Islands; the soundings in the channels over this bank vary considerably. A chain of reefs and shoals, on which lie Augusta, Duiven, Jerief, and the Mansfield Islets and through which the two southern channels lead, extends in an east-southeasterly direction from a position about 2 miles westward of Augusta Island to Batanta Reef, a distance of more than 30 miles.

Tides.—The character of the tides and the amount of the rise and fall in Dampier Strait are essentially the same as those at Saonek Anchorage (sec. 6-26).

6-31 **Currents.**—Vessels off the western entrance to Dampier Strait, between Tanjong Soes, the eastern extremity of Kofiau, and Tanjong Mabo, the southwestern extremity of Batanta, during the months between September and April will usually encounter a southerly current which is considerably influenced by the direction and force of the wind. Between May and August the current in this vicinity sets in a northerly or northwesterly direction. During the turning periods of the monsoons there is scarcely any current in this vicinity.

At the height of the northwest monsoon, in the narrow part of the strait, between Duiven and Jerief Islands, the ebb current sets east-northeastward for 6 or 8 hours at a rate of 4 to 5 knots at springs, and 1 to 3 knots at neaps. The flood current sets southwestward for 3 or 4 hours but is weak. At the height of the southeast monsoon the flood current here sets westward for 8 to 10 hours, setting successively to the west-southwest, southwest, and southwest-by-south; it then attains its greatest velocity, which at springs sometimes exceeds 5 knots, and at neaps 4 knots. The ebb at this season sets east-northeast or northeast, but is neither strong nor of long duration; it has been

observed, however, to attain a rate of 4 knots for periods of 1 to 2 hours.

At the eastern entrance to the strait the ebb current is generally the stronger during both monsoons; during the northwest monsoon an easterly current sometimes runs for two or three days in succession.

6-32 Directions for Dampier Strait.—Vessels coming from the west set an easterly course on the high northwestern point of Batanta, taking care not to approach the southwesternmost island of the Jef Fam group within 2 miles because of the detached reef that lies southward of that island. Close the northwest point of Batanta to about $1\frac{1}{2}$ miles distant, then steer 036° toward the western point of Mansuar Island. When the 610-foot hill on Batanta bears 203° astern, alter course to 023° in order to pass westward of the 5-fathom patch westward of Augusta Islet (sec. 6-39). When the eastern points of the Duiven and Augusta Islands come in range bearing 108° change course to 070° , passing southward of Mansuar, Kri, and Koh Islands.

If proceeding to Saonek Anchorage care must be taken to remain outside the line joining Koh and Saonek Besar Islands until the reef that lies northeastward of Koh has been passed. Vessels may pass Saonek Besar on either side, but in rounding that island to the westward they must give a good berth to the reef that extends out from that side of the island. The highest point of Gam Island and Saonek Besar Hill in range bearing 282° , leading well southward of the southwestern extremity of the ridge of reefs to the eastward of Saonek, is a good mark for vessels approaching Saonek Anchorage from the eastward.

Vessels desiring to take the channel close along the Waigeo shore when leaving Saonek Anchorage should pass to the north or south of Saonek Ketjil and parallel the Waigeo coast at a distance of one-half of a mile until

they are east of Majalibit Bay, when the distance offshore should be increased to 1 mile. The reefs are easily detected. South-eastward of Tanjong Babula, situated south-westward of the entrance to Majalibit Bay, there is an opening in the ridge through which a vessel may pass, but there is no clearly defined range for navigating it. A 2-fathom shoal lies northward of this entrance. At the eastern end of the ridge there is a passage but here, too, there are no marks; local knowledge is, therefore, necessary. With good visibility it offers no difficulties, but the small reef close under the shore, which is passed to the south, was barely discernible at the time of the survey.

Vessels pass close outside Memjai Islet, which has practically no coastal reef. Small vessels can pass between this islet and the shore, but, inasmuch as the currents here are strong, this course is not recommended. Beyond Memjai there is a convenient channel between the shore and Wajam Islet; it should be traversed on a midchannel course. Vessels may head offshore either eastward or westward of Wajam Islet, but attention must be paid to the reef that extends northeastward from the eastern end of this islet.

6-33 Eastbound vessels using the channel that passes southward of Augusta and Duiven Islands should bring Camphuis Islet to bear 028° , midway between Kri and Koh, and make good that course; it leads across the ridge eastward of Duiven Island over soundings of 6 to $6\frac{1}{2}$ fathoms. Vessels preferring to remain in deeper water should, when Duiven Island is about on the port beam, turn two or three points to starboard until the

northwest side of Camphuis is just open of the southeastern side of Koh, bearing 023°; the small mountain north-by-west of Saonek will then come into range with the northwestern side of Camphuis. Vessels coming from the east bring the last-named marks in range astern in good time and keep on that range line until Augusta and Duiven Islands are in range, when course may be set to pass northward of the northwestern points of Batanta.

The channel along the north coast of Batanta is good and easy to navigate. It is advisable, when between the northwestern point of Batanta and the northern extremity of Wroewarez Island, to remain north of the line that joins the north point of Dajang Island to the north point of Wroewarez in order to clear the dangers lying off the coast. This gives a margin of not less than 2 miles to all these dangers. Subsequently the outermost points of Batanta should be passed close to. When Tanjong Kandorwa is in range with the eastern side of Ajemi, just clear of Tanjong Eyanas, course should be changed to bring this range astern; this course leads across the ridge westward of Batanta Reef. Vessels bound to the southward from off Tanjong Eyanas should round that point and then proceed in a southerly direction to the deep channel eastward of Sagewin Strait.

6-34 ISLANDS ON THE NORTHERN SIDE OF DAMPIER STRAIT.—The Jef Doif Islands have been described in section 3-194.

The Jef Fam Group, lying off the western entrance to Dampier Strait, consist of two groups of islands between which there is a deep, clear channel.

6-35 Groot Fam (Penemu) (0°35' S., 130°16' E. [REDACTED]), the largest island of the northwestern group, and Keruo, the next largest island of the group, located about 1 mile westward of Groot Fam, are

high and rocky. A rocky peak 702 feet high, located near the northern end of Groot Fam, helps in identifying that island. Groot Fam is the only inhabited island of the group. A bank of soundings on which there is a least depth of 4½ fathoms extends west-southwestward 8½ miles from the west side of Groot Fam. The passage northward of Groot Fam, between that island and Jeben, is clear.

A shoal, with distinct discoloration lies about 4.5 miles 097° from the southern point of Groot Fam Island.

6-36 Fam, the largest and northeasternmost island of the southeastern group, lies about 2½ miles southward of the southern end of Groot Fam. Near the eastern end of the island are two hills of about equal height, and in its western part is a conspicuous flat-topped hill 456 feet high. There is a village on the northern tip of Fambemoek, a small islet southward. The other islands, lying southwestward of Fam, are low, of coral formation, but covered with high trees that can be seen for a distance of 16 miles.

Mingiman, the southwesternmost island of the group, located 11 miles southwestward of the western end of Fam, and Jar, the next island northeastward of Mingiman, are surrounded by deep water, but there are shoal depths around the other islands of the group. A detached 8-foot spot lies well outside the 100-fathom curve 1 mile southward of Mingiman. Within a distance of 5¾ miles eastward of Inus, an island lying 3¼ miles eastward of Jar, there are several shoal patches; the easternmost, with a least depth of about 2 fathoms, lies outside the 100-fathom curve. A rock over which there is a depth of 2¾ fathoms lies 2½ miles eastward of Fam. The reefs of this group are well-marked by discoloration.

6-37 Woodford Reefs, lying nearly midway between the southern part of the Jef Fam Group and Augusta Island, consist of

three rocky patches; over the southern patch there is a least depth of $2\frac{3}{4}$ fathoms and over the two northern patches, located $2\frac{1}{2}$ miles farther northeastward, there are least depths of $3\frac{1}{4}$ fathoms. There is but little discoloration on these reefs.

6-38 Mansuar ($0^{\circ}36'$ S., $130^{\circ}34'$ E., *H. O. Chart 2978*), lying about 3 miles southward of Gam, has three moderately conspicuous peaks that are 1,116, 1,257, and 1,148 feet high, from west to east; at its eastern end is a lower but more conspicuous hill 856 feet high. The south coast is steep-to and clear of off-lying dangers. Mansuar Village is located about $\frac{1}{2}$ mile westward of the east peak. The passage between Mansuar and Gam is obstructed by dangerous reefs. Near the western end of the extensive southern drying reef, $3\frac{1}{2}$ miles northwestward of the western extremity of Mansuar, is Airborei Islet.

Kri Islet, 705 feet high, lies close eastward of Mansuar Island, to which it is connected by a drying reef on which there is a small islet. There is a village located on the west end of Kri. The small Koh Islet, 135 feet high, lies on the southern side of a drying reef one-half mile northeastward of Kri. A detached 2-fathom spot lies $1\frac{1}{2}$ miles northeastward of Koh. There is deep water southeastward of these islets.

6-39 Augusta and Duiven Islets, lying $2\frac{1}{4}$ and 3 miles southward of the western part of Mansuar Island, are low and flat but are covered with high trees that make them visible for a distance of 16 miles. They lie near the western end of the ridge that extends across Dampier Strait. There is a detached 5-fathom patch lying about $1\frac{3}{4}$ miles westward of Augusta, and several 6-fathom patches in the immediate area. Although there is deep water in the channel separating Augusta and Duiven Islets the strong currents through it make its use inadvisable.

Jerief (Djerief) Islet, lying at the southern end of an extensive dry reef $7\frac{1}{4}$ miles east-southeastward of Duiven Islet, is similar in appearance to Augusta and Duiven Islets.

The Mansfield Islets, three in number, are

small, low, and flat; they lie on separate drying reefs about 4 miles eastward of Jerief. The southwesternmost islet is covered with brush, the middle islet with higher growth, and the northeasternmost with trees that make it visible for a considerable distance.

6-40 BATANTA ISLAND, located on the southern side of Dampier Strait and separated from Salawati Island by Sagewin Strait, is about 34 miles long, east and west, and $3\frac{1}{2}$ to 8 miles wide. It consists principally of a chain of moderately high and densely wooded mountains with a maximum elevation of 3,511 feet; it can be seen from the east or west for a distance of 30 miles.

6-41 The north coast of Batanta, very irregular in outline, consists of projecting spurs of the mountain chain; between these spurs are several deep bays. A number of islands lie close off this coast. All of these bays, except the westernmost, afford well-sheltered anchorage, but there are no good marks for approaching them. Vessels attempting to enter any of them should have on hand a large scale chart, such as *H. O. Chart 2978*. There are a few small villages on the north coast.

6-42 The west coast of Batanta is very steep and has no off-lying dangers. There are two bays on this coast, but they are so deep and exposed that they do not afford anchorage. Tanjong Mabo, the southwestern extremity of Batanta Island, consists of a hill 325 feet high, at the end of a long low neck of land; from a distance it appears as an island. Vischers Island, 213 feet high, situated westward of Tanjong Mabo, from which it is separated by a deep and clear channel $1\frac{1}{4}$ miles wide, is wooded and can be approached closely from all sides. On the northwestern extremity of Batanta is a cone-shaped 610-foot elevation which is conspicuous when seen from the northeastward or southwestward and from a distance appears as an island.

6-43 The south coast of the island is very

steep-to with the 100-fathom curve running closely along it; consequently there are no anchorages on this coast. Jodlo, the only village of any importance in this vicinity, lies on the south coast near the eastern entrance to Sagewin Strait.

A light is shown from a white iron framework tower, 33 feet high, on the southern shore of Batanta Island in a position about $2\frac{1}{4}$ miles northwestward of Sagewin Island.

6-44 Marchesa Bay ($0^{\circ}49' S.$, $130^{\circ}53' E.$, *H. O. Chart 2938*) occupies the greater part of the eastern side of Batanta Island. Nearly midway of the entrance, which is more than 2 miles wide between Tanjong Makoi and Tanjong Kandorwa, is Ajemi Island, 600 feet high. Northward of this island is a channel about 1,200 yards wide and clear of dangers. The narrow channel southward of Ajemi Island can be used only by small craft with local knowledge and then only when the reefs are showing. Vessels enter on an easterly course that leads northward of Ajemi Island and then steer for Maribio, a small islet situated in a bight at the head of the bay.

Safe anchorage can be taken in the northern part of the bay in depths of 16 to 22 fathoms, mud and sand. In the southern part of the bay, southward of the north tangent of Ajemi Island extended to Maribio Islet, and in the coves on the north side of the bay there are numerous reefs; these can be avoided by keeping the north side of Ajemi Island bearing more than 090° and Maribio Islet bearing more than 250° . On Mesawai Islet, situated in the southern part of the bay, there is a village.

Batanta Reef, the southeastern extremity of the ridge which extends across Dampier Strait from Augusta and Duiven Islands, lies 3 to 8 miles eastward of Tanjong Evanass, the eastern extremity of Batanta Island. The

least depth on the reef is $2\frac{1}{2}$ fathoms. Among these reefs there are very irregular currents.

Vessels bound from Sagewin Strait or Marchesa Bay and desiring to cross Batanta Reef should make good a course of 030° close along the east end of Batanta Island; this course leads across the reef in a least depth of 8 or 9 fathoms. Since the currents set strongly across this course at a position close northward of Tanjong Evanass, it is advisable to keep Tanjong Kandorwa, on the south side of Marchesa Bay, in range with Ajemi Island, just clear of Tanjong Evanass.

6-45 Sagewin Strait, (*H. O. Chart 2978*), between Batanta and Salawati Islands, has a length of about 28 miles, from the northwestern extremity of Salawati Island to the eastern extremity of Batanta Reef, and a width of $1\frac{3}{4}$ to $3\frac{3}{4}$ miles. It has a deep straight channel. The southern shore of the strait is described in connection with Salawati Island in section 6-65.

Sagewin Island, Tanjong Dadi, and Tanjong Wasaget, all located on the south side of the western entrance to Sagewin Strait, are conspicuous from a great distance and, therefore, make good landmarks for that entrance. Heavy rain squalls often obscure the entrances to the strait and make navigation through it difficult at night.

6-46 THE NORTHWEST COAST OF NEW GUINEA, from the Cape of Good Hope to Tanjong Sorong, 80 miles to the west-southwestward, is generally high and is closely backed by high mountains, but in places along it there are tracts of level land near the shore. On this stretch of coast are a number of small, scattered villages, and several unimportant streams empty into the sea along it. There are no dangers outside the 100-fathom curve. Vessels coming from

Sagewin or Sele Straits usually proceed rather closely along the coast and are thus able to take bearings on the numerous hills between Doré Hoem Bay and the Cape of Good Hope. The most important of these hills are: Morait, 1,424 feet high, located westward of Doré Hoem Bay; Olifant, 1,539 feet high, located $4\frac{1}{2}$ miles southwestward of Tanjong Sawasar; a round hill 1,677 feet high, $2\frac{1}{2}$ miles eastward of Tanjong Sawasar; and Tonggerap (Groote Olifant), 3,868 feet high, the most conspicuous peak along this coast, located $8\frac{3}{4}$ miles eastward of Tanjong Sawasar.

The northern part of this stretch of coast is backed at a distance of about 10 miles to the southward by the Tamrau Mountains, which attain a height of 9,842 feet, but are usually masked by clouds. Among the mountains are many peaks with elevations of 3,000 to 5,600 feet, but they are of little use to navigation.

6-47 The Cape of Good Hope (Tanjong Jamursba) ($0^{\circ}21'S.$, $132^{\circ}25'E.$), the northern extremity of New Guinea, may be distinguished from Tanjong Weios, situated 19 miles to the eastward, by the fact that from a distance it appears to be marked by light yellow stripes, whereas the latter point presents a monotonous rocky appearance. The cape rises somewhat gently from the sea and has on its summit a small round hill.

6-48 Coast.—From the Cape of Good Hope the coast trends 80 miles in a west-southwesterly direction to Tanjong Sorong, at the northern entrance of Sele Strait. Between the cape and Tanjong Opmarai, 10 miles to the west-southwestward, there is a wide bank of soundings on which vessels may anchor in depths of 5 to 10 fathoms during the southeast monsoon; this anchorage, however is untenable during the northwest monsoon because of the heavy swell.

6-49 Kor, a village, lies about 5 miles west-southwestward of the Cape of Good Hope and one-half of a mile eastward of the mouth of Sungai Kor. This river is navigable by small craft for about three-fourths of a mile. A conspicuous stone that is covered

with vegetation lies off the village. As stated above, anchorage can be taken anywhere along this part of the coast. Boats can land on the east bank of the river just inside the entrance, or in the lee of some rocks close eastward of the mouth of the river.

6-50 Coast.—From Tanjong Opmarai, 5 miles westward of Kor village, the coast trends southwestward for nearly 28 miles to Tanjong Sawasar. The first part of the coast is level in places, particularly at the mouth of Sungai Wewe. From a position midway between Sungai Wewe and Tanjong Sansapor to Tanjong Sawasar the coast, with the exception of a patch of level land close southward of Tanjong Sansapor, through which Sungai Wesan discharges is steep. Between Tanjong Sansapor and Tanjong Kasbi, 10 miles to the southwestward, the coast recedes, forming an open bay.

A reef, which dries, extends about 250 yards westward from the village of Sansapor. A coral reef, with a depth of 3 feet over it, lies about 1 mile southwestward of the village. The drying coastal reef extends about one-quarter of a mile offshore in a position about $1\frac{1}{4}$ miles northeastward of Tanjong Kasbi. A group of three drying rocks lie close offshore, about 3 miles northeastward of Tanjong Kasbi.

An 8-foot patch lies about $2\frac{1}{4}$ miles northwest of Tanjong Kasbi.

6-51 Meos Su (Mios Soe) Islands ($0^{\circ}21'N.$, $132^{\circ}10'E.$), are two small coral islands named Middelburg and Amsterdam and lying, respectively, $2\frac{1}{2}$ and $4\frac{1}{2}$ miles offshore and 4 to 6 miles westward of Tanjong Opmarai; they are low, reef-fringed and covered by high trees which make them visible for a great distance.

Light.—A light is shown from an iron skeleton tower 54 feet high, located on the north coast of Amsterdam Island.

Reefs.—A very shallow reef about one-half of a mile wide extends 1 mile from the northwest point of Amsterdam. The northeastern point of Middelburg is low. A drying reef extends one-half mile northward from Middelburg.

The channel between Middelburg and the shore is about 2 miles wide; it is navigable and, except for a reef of $3\frac{1}{2}$ fathoms lying $1\frac{1}{2}$ miles east of Middelburg, and a 5-fathom patch about $\frac{1}{2}$ mile farther northward, is clear of dangers. There is a pier on the south side of Middelburg. Coconut plantations are on both islands.

The islands are difficult to make out at night from the westward, unless the vessel is fairly close inshore, because of the dark coast behind them, but from the eastward they can always be seen, for they are then open of the coast. The channel between these islands and the mainland can be used at night when the visibility is good.

6-52 Anchorages.—Anchorage is available, in a depth of 25 fathoms and in good holding ground of coral and mud, southward and westward of Amsterdam Island.

Anchorage is also available in a depth of 8 fathoms and in good holding ground of coral and sand, southward of Middelburg Island in a position close to the New Guinea shore. In this vicinity, however, heavy swells are caused by southwesterly winds which usually blow during the night and in the early morning hours.

6-53 Coast (continued)—Mega Road.—Sungi Mega (Maga) discharges into the sea southward of Tanjong Sawasar. A small village stands on the south side of the mouth of this river. Within a distance of $1\frac{1}{2}$ miles west-northwestward of the mouth of the river are three drying reefs, and about one-fourth of a mile outside the outermost reef is a conspicuous above-water rock. Nearly 1 mile northwestward of this rock is a detached $2\frac{1}{2}$ -fathom shoal. In the small roadstead inside the reefs are depths of $3\frac{1}{4}$ to 5 fathoms, sand and mud, where vessels can anchor. Anchorage can also be taken outside the road in depths of 6 to 8 fathoms northeastward between Mega Road and Tanjong Sansapor.

6-54 Coast.—Near Sungi Mega the mountains lie back from the coast. For some distance to the westward of the mouth of this river there is a beach interrupted only in places where a projecting cliff rises directly from the sea; near Asbakin, however, the mountains lie nearer the sea. From Mega Road the coast trends west-southwestward to Doré Hoem Bay with no intervening bights. A $1\frac{1}{2}$ -fathom coral reef lies about $5\frac{1}{2}$ miles westward of the mouth of Sungi Mega and $1\frac{1}{4}$ miles offshore. A $3\frac{1}{2}$ -fathom patch lies about $1\frac{1}{2}$ miles north of this latter patch. Tanjong Asi, situated $12\frac{1}{2}$ miles west-southwestward of Mega Road, may be identified by a spur of a mountain, 1,802 feet high, which lies to the eastward.

6-55 Asbakin village, situated on the banks of the Sungi As about $1\frac{1}{4}$ miles westward of Tanjong Asi, stands on a flat beach which has steep-to rocks on both ends. The coastal range in this vicinity is of reddish stone on which a species of cajaput tree grows. A narrow reef extending about 3 miles in an east-northeast and west-southwest direction with a least depth of $3\frac{1}{4}$ fathoms lies $2\frac{1}{2}$ miles northwestward of Asbakin, and a $6\frac{1}{2}$ -fathom shoal lies about 2 miles northwestward of the village.

Sausut village lies about 5 miles westward of Asbakin on the bank of a small stream of the same name.

6-56 Doré Hoem (Dorei Hum) Bay, penetrating the coast for $2\frac{1}{2}$ miles in a westerly direction, lies southward of Tanjong Doré (Dorei) ($0^{\circ}44'S.$, $131^{\circ}32'E.$). It affords good anchorage in a depth of about 15 fathoms, sheltered against northerly swells. Off the east entrance of the bay is the small, low Hoem (Hum) Islet, which is covered with high trees. A wide reef extends 275 yards westward and northeastward from the islet, and a shoal area on which there are several drying reefs extends westward nearly 1 mile and northward $1\frac{1}{2}$

miles from Hoem Islet. A detached shoal, with a least depth of 1 1/2 fathoms, lies about 1 mile eastward of Tanjong Dore.

The entrance channel, lying about midway between Tanjong Dore and Hoem Islet, is deep and about 275 yards wide between the 5-fathom curves. Two detached 13-foot shoals lie in the middle of the bay, about 1 1/2 miles southwestward of Hoem Islet.

Makebon village lies at the northern entrance point.

TIDES.—In Dore Hoem Bay there is both a diurnal and a semi-diurnal tide, but the latter predominates. The spring lows of the two tides can coincide. As a result of this coincidence the lowest water that can be expected is about 3.3 feet below mean sea level. The maximum rise, occurring at all semi-diurnal spring tides, is about 2 feet above mean sea level.

6-57 COAST.—The steep coast between Tanjong Dore and Tanjong Sorong is uninhabited and has no landmarks that would be of use to navigation. This stretch of coast is so steep that it affords no anchorage; off the mouth of Sungai Wasamson (War Samson), located 9 1/4 miles west-southwestward of Tanjong Dore, however, vessels may anchor in 25 fathoms 650 yards offshore during fine weather. This stream is navigable by small craft for a distance of about 1 mile. Batu Lobang, lying about 1 3/4 miles northeastward of the mouth of Sungai Wasamson, is a rock 80 feet high with an arched opening that may be seen from a position close eastward.

6-58 TANJONG SORONG, the northeastern entrance point of Sele Strait, is of moderate height; reefs project nearly three-fourths of a mile northward from the point.

TANJONG SORONG LIGHT is shown on the western end of the point.

6-59 RAM ISLAND 214 feet high, lying close southwestward of Tanjong Sorong, is covered with tall trees. On the drying reef northward of Ram there are three islets that are covered with vegetation, and on the reef that extends nearly 1 1/4 miles westward from the island there are some low black rocks.

6-60 SORONG ROADS is in the northeastern end of Sele Strait about 4 miles southward of Tanjong Sorong. Specifically the roads' limits extend between the parallels of 0° 50' S. and 0° 58' S., and westward from the coast to the meridian of 131° 11' E.

Tanjong Nujew is about 3 1/2 miles southward of Tanjong Sorong. Close under the point are the piers and offices of an oil company and numerous shore structures. A **LIGHT** is shown on Dopior Islet, close off the point. A light is shown from the root of the Oil Jetty. South-southwestward of Tanjong Nujew are the islands of Doom and Nanah.

SORONG is built on the shore northward of Tanjong Nujew. It has a number of shipping facilities. There is a native village called Sorong-Doom on Doom Island. There are two piers at the village. The southernmost pier was reported (1963) to project about 180 feet from the shore. Its outer end was reported to be 130 feet long and 26 feet wide, indicating an L- or T-head, with a depth of 26 1/4 feet (LWS) alongside.

The watertanks and oil tanks on the high portion of Tanjong Nujew, about 1300 yards east-by-north of Dopior Islet, serve as good landmarks visible by day for a considerable distance seaward.

TSIOF ISLAND, 175 feet high, is the westernmost of the islands off Tanjong Nujew. It is wooded, and on it are gardens belonging to the inhabitants of Doom Island; it lies about 2 1/2 miles south-southwestward of Ram Island. Off the southwest side are some rocks above water, and on the north side the shore reefs extend 1/4 mile offshore; three detached reefs which have depths of 3 to 11 feet over them and are marked by discolored water lie 1/2 to 2/3 mile off the north shore of the island. A **LIGHT** is shown from the southwest end of Tsiof Island.

The northernmost of these reefs has a depth of 11 feet and is marked by a lighted buoy, painted in red and white vertical stripes and surmounted by a cone, moored close northward. This buoy is equipped with a **RADAR REFLECTOR**.

One-half of a mile east-northeastward of the northeastern end of Tsiof, is a small reef having a depth of 5 feet.

DOOM ISLAND, 126 feet high, is about 1/2 mile in extent and lies about 1/2 mile south-

westward of Tanjong Nujew. The passage between Doom Island and the mainland is deep, and was wire dragged to a depth of 46 feet in 1953. There is however a 20-foot patch about 400 yards eastward of the northeast side of Doom Island and a 3-fathom patch about 500 yards north-by-westward of the west extremity of Doom Island. A white can BUOY with a central horizontal band of alternate diagonal red and white stripes, equipped with a RADAR REFLECTOR, is moored on the north edge of the 20-foot patch. A vessel should not attempt to pass between Tanjong Nujew and Dopior Islet, as the passage is obstructed.

A stranded WRECK and a beacon with a white cylindrical topmark mark a reef, with a least depth of 1 fathom, located about one-third of a mile southeastward of the southeastern extremity of Tsiof Island.

A 3-FOOT PATCH lies about 1/4 mile southward of the 1-fathom reef.

A CORAL REEF, about 100 yards in diameter and having a least depth of 2 1/4 fathoms, is located about one-half of a mile east-southeastward of the southeastern extremity of Tsiof Island.

A 10-FOOT SHOAL is located about 860 yards west-by-northward of Sorong front range structure and about 625 yards southeast of the light structure at the root of the oil pier.

6-61 BEACONS-BUOYS-WRECKS.—The following beacons are located within the harbor limits of Sorong: A beacon with a black cylindrical topmark marks a drying reef that is located about 1400 yards south-southeastward of the south extremity of Nanah Island. A WRECK, stranded on the southwest side of a reef, is located about 1/2 mile southward of the beacon. Beacons are located about 1/3 mile southwestward of the south end of Nanah Island to mark the reef extending in that direction.

A BEACON surmounted by a red truncated cone is located about 1/4 mile east-northeastward of the south extremity of Nanah Island.

A 5-foot patch, and a shoal swept to 25 feet, are located about 400 yards southeastward and about 575 yards south-southeastward, respectively, of the south extremity of Nanah Island, close westward of the west edge of swept channel. Foul ground extends from these dangers to Nanah Island.

A detached reef, which lies about 300 yards off the south side of Doom Island, is marked by a beacon with a red and white banded cylindrical topmark. Two seaplane mooring buoys are located northeastward of this reef, in the vicinity of the pier at Sorong Doom.

A DRYING REEF is located about 1/2 mile south of Sorong front range structure. A stranded WRECK and a BEACON, with a green cylindrical topmark, mark this reef.

A WRECK with a swept depth of 6 1/4 fathoms, lies off the oil pier at Sorong.

Several shoals and drying reefs lie between Doom Island and Nanah Island, about one mile southward, and also between Nanah and Tsiof Islands.

Dangers with less than 43-foot depths over them, not elsewhere described herein, and located within the swept area of Sorong inner roads are: a patch with a swept depth of 21 1/2 feet is located about 1 1/4 miles south-southwestward of Sorong front range structure; a patch with a swept depth of 18 1/2 feet is located about 1 1/2 miles south-by-westward of Sorong front range structure; two patches, one with a swept depth of 32 feet and one with a swept depth of 14 feet are located about 1/2 and 3/4 mile, respectively, east-northeastward of the northeast extremity of Nanah Island.

NOTE.—A large part of Sorong Roads off the shoals and dangers has been wire dragged to a depth of 46 feet. An area southeastward of Nanah Island in the center of the swept channel and on the range line of the south approaches to Sorong inner roads has been swept to a depth of about 21 1/2 feet over two patches, with depths over them of 21 1/2 feet and 33 feet respectively, which are located close southwestward of the range line; the northeast side of the swept channel adjacent to this area has been swept to a depth of 39 1/2 feet.

RANGE LIGHTS.—The channels into Sorong inner roads, one from westward and one from south-southwestward, are marked by two lighted ranges. The front range structure, common to each range, is located on a fringing reef about 2,300 yards east-southeastward of Tanjong Nujew. The rear structure of the range marking the approach from westward is located in range 102 1/2° about 2,100 yards from the front range structure. The rear

structure of the range marking the approach from south-southwestward is located in range 032 1/2° with the front range structure.

6-62 ANCHORAGE.—Anchorage can be taken in the inner roadstead in 11 to 17 fathoms in the swept area southward of a line joining the can buoy moored on the north edge of the 20-foot patch (sec. 6-60) off the northeast side of Doom Island, and the green beacon marking the stranded wreck located about 1/2 mile south of Sorong front range structure. This anchorage is open southward and southeastward. The bottom of mud and clay is good holding ground.

Temporary anchorage, for the purpose of awaiting the pilot, is authorized northwestward of Doom Island between the outer light buoy and Dopior Islet.

A number of mooring buoys are laid off the shore east-southeastward of Tanjong Nujew; southeastward of Doom is a mooring buoy for government craft.

WEATHER.—During the west monsoon in Sorong (December to March) the wind is of insufficient force to cause difficulty. A slight ocean swell reaches as far as the roads. There is a heavy rainfall, although the amount is less than during the east monsoon. During the east monsoon (May to October) the southeasterly winds blow with a strength of 3-6, and care is necessary when docking or undocking a vessel. When mooring, the mooring buoys should be used.

Tides.—Tidal heights at Tanjong Sorong (0°50' S., 131°13' E.) above datum of soundings are: MHWS 5.3 feet, MHW 4.1 feet, MLWS 1.3 feet, MLWN 2.5 feet, MSL 3.3 feet.

TIDAL CURRENTS.—Near Tanjong Nujew the tidal currents are strong. Because this area is subject to strong tidal currents, a vessel intending to remain at anchor for an extended period, should moor.

6-63 DIRECTIONS.—Vessels bound for Sorong from northward should pass westward of the low black rocks westward of Ram Island; the light structure on the west extremity of Tsiof, bearing less than 178° clears these rocks. The vessel should then

steer to pass northward of the lighted buoy marking the 11-foot patch about 3/4 mile northwestward of the north extremity of Tsiof and she should remain north of the 102 1/2° range line until eastward of the 11-foot patch.

Note: A course of 108° with Dopior Islet light ahead leads centrally in the swept channel about 700 yards northward of the 11-foot patch.

When eastward of the 11-foot patch, course should be altered southward to bring the range lights into line ahead, bearing 102 1/2° which alignment leads between Dopior Islet and Doom Island toward the oil pier. A vessel bound for the anchorage should alter course southeastward when the east extremity of Doom Island bears about 187°, passing eastward of the 20-foot shoal located about 400 yards off the northeast side of Doom Island.

A vessel approaching Sorong inner roads from southward should steer for the range beacons, in range 032 1/2°. It should be noted that this course leads close northwestward of the 21 1/2-foot patch (see note, sec. 6-61) which lies about 1/2 mile east-by-southward of the south extremity of Nanah Island.

In docking or undocking, a towboat is usually necessary.

Pilotage within the roads of Sorong is compulsory for vessels of 50 tons net or more. No night pilotage will be performed except in cases of emergency. Vessels can anchor to await pilot westward of Dopior Islet. The signal station is located on Tanjong Nujew.

6-64 SORONG-DOOM (0°53' S., 131°14' E.) on the island of Doom is the residence of a Government official. The native houses are built on pilings. On the mainland, eastward of Tanjong Nujew, is the town of Sorong, the greater part including the facilities and residences of a Netherlands oil company. In 1960 the population of Sorong and Sorong Doom was about 10,000. Imports include foodstuffs, consumer goods, and oilfield machinery. Exports consist mostly of crude oil.

BERTHAGE.—Eastward of Tandjoeng Nujew there are several jetties and a Cargo Wharf.

The Cargo Wharf is 433 feet long, 33 feet wide, and has depths of 30 to 40 feet alongside.

The Oil Jetty, located close eastward of the Cargo Wharf, is about 435 feet long, and has an L-head with a length of about 60 feet with a depth of 39 feet alongside. There are dolphins and hauling off buoys to facilitate berthing and unberthing. Tankers of 30,000 gross tons can berth alongside. The pier was reported (1966) to be in a poor state of repair.

Coaster Jetty, located eastward of the Oil Jetty, has a length of about 130 feet with a depth of 25 feet alongside.

Government Landing Stage, located on Sorong Doom, has a depth of 13 feet alongside, but is suitable only for small craft and lighters.

Covered, uncovered, and refrigerated lighters are available. The oil company maintains a number of tugs, barges, and river launches.

There are two 5-ton mobile cranes, one 25-ton crawler crane, and a floating crane of 24-ton capacity. There are several smaller floating cranes in the harbor area.

REPAIRS.—Minor repairs to hull and machinery can be made on large vessels.

SUPPLIES.—Water, fuel and diesel oil are obtainable. Fuel and diesel oils are available at a rate of 200 to 400 barrels per hour. Provisions are scarce.

MEDICAL.—There is a modern hospital located about 1/2 mile northward of the Cargo Wharf. There is a government hospital at Sorong Doom. There is a large hospital at Sorong.

COMMUNICATION by radio or telegraph can be made at Sorong Doom. Air service connections can be made by a launch to the airfield on Jefman Island. Ships call here regularly.

6-65 SALAWATI ISLAND is separated from the western end of New Guinea by Sele Strait. Its coasts are regular and without any deep indentations. The greater part of the island consists of very low land which is covered with impenetrable jungles; the northwestern part of the island, however, is mountainous, with several high peaks. The

north coast consists of limestone hills about 1,300 feet high, rising to over 2,000 feet in the western part, but considerably lower than Batanta to the northward. The west coast, except for the northern portion, is low and marshy. The east coast, near Samate, is low and swampy, with extensive forests of sago; on the beach are numerous coconut trees. There are some creeks, but no rivers. The only village of any importance on the island is Sailolof, located on the southwest coast.

6-66 NORTH COAST OF SALAWATI—ANCHORAGES.—The north coast of the island between Sagewin and Jef Doif Islands can be approached very closely. Sagewin Island, situated at the western entrance to Sagewin Strait and close northeastward of Tanjong Dadi, the fairly high northwestern extremity of Salawati Island, is hilly but not very high; the narrow channel that separates Sagewin Island from Salawati is deep and clear. On the northwest end of Sagewin Island there is a small village that is made conspicuous by the coconut trees that surround it. Anchorage can be taken in a depth of 25 fathoms at a distance of about 220 yards off the southeast extremity of the island, but there is frequently a current of 3 to 4 knots at this anchorage at high and low water.

TIPIN ROAD lies on the north coast of Salawati, on Sagewin Strait, about 7 miles eastward of Sagewin Island. There is anchorage in a depth of about 25 fathoms, sand, about 330 yards from the shore, to the westward of the mouth of a stream; less depths can be found closer inshore. Lelaa Islet lies close inshore on the coastal reef about 8 1/2 miles eastward of Sagewin Island.

6-67 JEF DOIF (Snapan) (0°53' S., 131°01' E.), is an islet 555 feet high, situated 1 mile off the northwest extremity of Salawati; it has a round hill on the north side and is low and flat in the southern part. The islet is joined to the coast of Salawati by a shallow ridge.

There is good anchorage during the southeast monsoon in the southwest corner of Waijaam Bay, located 6 1/2 miles west-southwestward of Jef Doif. The anchorage is in 26 fathoms with Ajemi Islet, situated at the eastern end of Batanta Island in range with

Tanjong Joepleket, and the drying rocks on the reef about $1\frac{3}{4}$ miles west of the south end of Jef Doif clear to the northward of that island.

Tides.—Near Jef Doif Island there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring lows of the two tides can coincide. As a result of this coincidence the lowest water level that can be expected, occurring in December or January and June or July, is 2.6 feet below the mean level. The highest water level that can be expected, occurring at all semidiurnal spring tides, is 2.0 feet above the mean level.

6-68 Island and dangers off Samate.—Extensive banks and reefs, partly dry at low water, extend offshore.

Bam Islet, moderately high and wooded, lies near the outer edge of the drying reef $1\frac{3}{4}$ miles northward of the village; there are several bare rocks near it.

On the east side of the anchorage are the Rombombo Islands and the drying reef that surrounds them. Jefman, the northeastern island, is low, with a beach and some houses on the east side; this beach can be approached closely by boats. On the island are coconut plantations. The island to the southwest has high vegetation on the northeast end, but is low elsewhere; it has a sandy beach. On the other islets, which are low, there are some trees.

Pier.—There is a *T-headed* pier on the southeast side of Jefman Island. In 1950 there were depths of 7 to 12 feet alongside the north and south ends of its head, respectively.

Airfield.—There is an airfield on Jefman Island.

Katapatjan Rock ($0^{\circ}56'$ S., $131^{\circ}06'$ E., on the western edge of the drying reef surrounding the Rombombo Islands, is a jagged mass of stone that has been whitened by birds' droppings; it looks somewhat like a crouching lion. A $2\frac{3}{4}$ -fathom detached reef lies about 1,400 yards west-northwestward of Katapatjan; it may be recognized by discoloration and slight breakers. A line of detached reefs extends across the approach to the roadstead northwestward of Katapatjan.

Anchorage can be taken in 39 feet, hard bottom, $\frac{3}{4}$ mile eastward of Bam Islet with Katapatjan Rock in range with the south point of Jefman. There is always a northeasterly swell in this anchorage, causing vessels to roll heavily. Cargo can be worked only during high water.

6-69 Directions.—Vessels coming from the northward steer a course of 180° for Matan Island, which lies in Sele Strait $2\frac{1}{4}$ miles southeastward of Jefman Island, until Tanjong Sorong bears 090° and then steer for Jef Doif. When Bam Islet bears 170° steer for it on that course until Katapatjan is in range with the north point of Rombombo Island, bearing 097° ; then steer gradually around to the eastward so as to bring Katapatjan in range with the south point of Jefman and anchor on this range line.

6-70 Samate, near the northeast extremity of Salawati Island, is a large village consisting of houses built on piles. The sandy strip of coast is only about 35 yards wide. The village was reported (1956) to be deserted.

6-71 Islands off the west coast of Salawati.—The islands westward of Salawati are low and thickly overgrown; they lie on long, narrow ridges that run parallel to the coast. On the outer ridge lie the Kaboe Islands and Loslos, with depths of $4\frac{1}{4}$ to 5 fathoms between them and with depths of 7 to 9 fathoms on either side of the ridge. However, a 1-fathom shoal lies about $\frac{1}{4}$ mile southward of Ifmoen, the westernmost of the Kaboe Islands. Nearly 6 miles south-southeastward of Loslos and 5 miles westward of Denie there is a stony $2\frac{3}{4}$ -fathom patch. Reefs in this vicinity are usually not marked by discoloration.

Gebroken Islands, Jef Danja, and the two Mokon Islands lie on the next ridge to the eastward; the northern portion of this ridge is separated from the Kaboe Islands by a channel with depths of more than 25 fathoms. Farther inshore are several other ridges with islets on them; for information regarding these as well as the many detached shoals in this vicinity the chart must be consulted.

Strong tidal currents and muddy water make the area northward of the parallel of Sailolof village, between the Salawati shore and the outer ridge, on which the Loslos and Kaboe Islands lie, quite unnavigable.

6-72 Sailolof Anchorage ($1^{\circ}15' S.$, $130^{\circ}45' E.$) lies off Sailolof village, about $13\frac{1}{2}$ miles northwestward of Tanjong Kamjolo, the southeastern extremity of Salawati Island. The recommended anchorage is in $3\frac{1}{4}$ to 4 fathoms with the mosque at Sailolof bearing 054° and Bodo Islet in range with the south side of Tjoen Islet, bearing about 292° .

Vessels making for Sailolof Anchorage should bring Loslos astern on a westerly bearing and then steer straight for Oemien, giving the latter islet a wide berth and proceeding to the roadstead on a course of 054° on Sailolof mosque. Another route is to pass close southward of Denie and Oemat, and then to steer for Tjoen until the mosque bears 054° .

Tides.—At Sailolof Anchorage there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring highs and the spring lows of the two tides do not coincide. The maximum rise and fall that can be expected are, respectively, 1.6 feet above and 1.6 feet below mean sea level.

6-73 Sailolof, a fairly large village on the southwest coast of Salawati, consists of a double row of houses built on piles on the beach. A broad trail with marshes on either side runs back of the village. Drinking water is obtained from wells. There are a number of coconut palms around the village and on the adjacent islands; coconut oil is the chief article of export.

6-74 SELE STRAIT separates Salawati Island from New Guinea. The depths in the northern part are irregular, but nearly any deep-draft vessel can pass through the strait without difficulty. The principal routes through Sele Strait were swept in 1951.

Tanjong Sele, the southern entrance point of the strait, is a rocky headland, about 33 feet high, which is covered with high trees; it affords a good mark for vessels approaching from the southward. Oempe Islet, located about $4\frac{1}{2}$ miles east-southeastward of Tanjong Sele, as well as the two low islands, Membok and Gelo, lying southward of Salawati and westward of the south entrance of Sele Strait are seen shortly thereafter. These islands consisting of sand, mud, and coral, are covered with high trees and are uninhabited.

Light.—A light is shown from the west extremity of Oempe Islet.

Shoals.—Numerous shoals, with depths of 1 fathom to 5 fathoms, lie close westward, southwestward, and southeastward of Oempe Islet, the positions of which can best be seen on the chart. Depths of from $3\frac{1}{4}$ to $10\frac{1}{2}$ fathoms, the positions of which can best be seen on the chart, lie between $13\frac{1}{3}$ and 21 miles southwestward of Oempe Light. Some of these depths are swept. For shoals lying southeastward of Oempe Islet see section 6-81.

A deep channel gives access to the narrow southern part of the strait, which is clear

and deep and which ends near Tanjong Kanelmelmak, situated about 9 miles north-northeastward of the southeastern extremity of Salawati Island. From there the strait widens and is strewn with islets, particularly the southern portion.

The western side of the southern approach is bounded by the bank that extends from Salawati and on which are Gelo, Membok, Kalilip, Omaki, Peli, Sabba, and Pan, as well as some islets close inshore near Saileen village. The south coast of Salawati, between Tanjong Menonket and Tanjong Kamjolo, is low and covered with mangroves; by the latter point it rises a little and a red patch is seen; farther northward it is again low and covered with high trees.

During the west monsoon there is good anchorage to the eastward of Peli in 6 to 9 fathoms, hard bottom. In the east monsoon there is a good berth to the eastward of Loego Islet, in the southern entrance to Sele Strait, near the New Guinea shore, in 14 fathoms, sand and mud.

The New Guinea coast, comprising the eastern side of the strait, resembles that of Salawati. Seget village ($1^{\circ}24'S.$, $130^{\circ}58'E.$) situated eastward of Loego Islet, is inhabited by fishermen who collect trepang and catch turtles. It is the headquarters of a native government official. There is a pier with a depth of 5 feet at its head.

Jef Kasim, lying in the narrow part of the strait $6\frac{1}{4}$ miles above Loego, may be passed on either side; if the eastern side is chosen care must be taken to avoid a drying reef that lies in the southern part of that channel near the New Guinea shore. An unofficial beacon marks the reef.

Lights.—A light is shown at the southern entrance of Sele Strait, on the northeast extremity of Membok Island.

A light is shown at Kampong Wiljam, on the Salawati shore opposite Kasim.

6-75 Kasim ($1^{\circ}18'S.$, $131^{\circ}01'E.$) is a settlement that lies eastward of the south-

ern extremity of Jef Kasim. A drying reef extending about 750 yards offshore fronts the settlement. There are numerous piles along the outer edge of the reef. A pier extends to the edge of the drying reef, and a larger **T-shaped** pier that extends to deeper water lies about 150 yards to the northward. There is an oil pipe-line running ashore from the latter pier. A crane stands on the face of the pier which has about 30 feet alongside the south end, and about 27 feet off the north end. The least depth in the vicinity of the pier, beyond the 3-fathom curve, is 24 feet close off its southern end.

Northward of Tanjong Waifkalettet, located at the north end of the east side of the narrows and marked by a **beacon**, the strait becomes wider but is encumbered by numerous islands, reefs, and shoals; all of these islets except Matan and Doom are covered with trees. There is scarcely any discoloration over the reefs. Of the islets in this part of the strait Saloetoe Genan, situated close eastward of Saloetoe Pele, is, because of its being covered with higher trees than the other islets, the most conspicuous. Farther northward are the larger islands, Warir and Kabra, separated from Salawati by Lenna Strait and from each other by the Sangoilin Mon. Near the northern entrance the number of islands decreases, and good marks are provided by Matan ($0^{\circ}57'S.$, $131^{\circ}09'E.$) and the four Rombombo Islands.

6-76 Lights.—A light is shown on the western extremity of Kamoomjel. The latter is an island lying close off the southeastern side of the strait about 3 miles east-northeastward of Tanjong Waifkalettet.

A light is shown from a white 8-foot structure standing on the reef extending 400 yards northward from Segarau Island, about 4 miles north-northeastward of Kamoomjel. This light forms a $195\frac{1}{2}^{\circ}$ range with the light on Kamoomjel.

A light is shown from a white 8-foot

(3534) **NEW GUINEA**—Northwest coast—Dampier Strait—Sele Strait—Buoy **changed.**—The lighted buoy in $1^{\circ}00.4'$ S., $131^{\circ}11.2'$ E. (approx.) has been changed to a *red and white vertically striped* buoy and shows a *Fl. 5 sec.* light. (N.M. 22/66.)

(B.P.I., 11 (075), Djakarta, 1966.)

H.O. Chart **2978.**

H.O. Pub. 73, 1952, page **191.**

structure standing on the northeast point of Balbili Island.

A light is shown from a white 49-foot structure with a white triangular daymark, point down, standing on the reef close westward of Wolo Genan, about $3\frac{1}{2}$ miles southward of Balbili Island. Balbili Island Light and this light form a 180° range.

A light is shown from a white 8-foot structure standing on Bolke Islet close off the southern end of Kabra Bemoek.

A light is shown from a white structure standing on a drying reef lying close northwestward of Oenaginim Island.

Light buoy.—A light buoy, painted black, is moored on the western side of a 7-foot reef located about $2\frac{1}{2}$ miles northeastward of the northern end of Kabra Island.

Buoy—beacons.—A black conical buoy, fitted with a radar reflector, marks a 6-foot shoal located $\frac{1}{2}$ mile east-northeastward of Segarau Island light structure.

A beacon stands on the northern extremity of a drying reef almost a mile northeastward of the northern end of Kabra Island.

A beacon marks Jef Nanas, an islet located $2\frac{3}{4}$ miles northeastward of Tandjoeng Waifkalettet.

6-77 Shoal depths.—A shoal, with a depth of 6 fathoms, is located about 1 mile eastward of the northern end of Kabra Bemoek Island.

A shoal, with a depth of 3 fathoms, lies about $\frac{1}{4}$ mile northeastward of Segarau light structure. Shoals with depths of 23 and 25 feet, respectively, lie close westward and eastward of the $195\frac{1}{2}^\circ$ range line and about $2\frac{2}{3}$ miles northward of the light structure previously mentioned.

A shoal, with a least depth of 26 feet, is located about $1\frac{1}{4}$ miles southwestward of the southern extremity of Jawja Island.

A drying rock is located about $\frac{1}{2}$ mile northwestward of the northwestern extremity of Makmak Island.

A rock with a depth of 3 feet lies about $1\frac{1}{2}$ miles eastward of the northeast extremity of Kabra Island. A stranded wreck lies close southeastward of the rock.

Two detached shoals, each with depths of $11\frac{1}{2}$ feet, lie on the western side of the 180° range in a position about $3\frac{1}{2}$ miles northward of the northern extremity of Kabra Island.

A number of shoals are located in the passage between Kabra Bemoek and Balbili Islands and in the area eastward of the former and northward of the latter island. The shoals are located as follows, bearings and distance from the northern end of Balbili Island:

(a) A shoal, with a least depth of $20\frac{1}{4}$ feet, about one-half of a mile north-northwestward.

(b) A shoal, with a least depth of 13 feet, about one-third of a mile northwestward.

(c) A shoal, with a least depth of $32\frac{3}{4}$ feet, about $\frac{2}{3}$ mile northward.

(d) A shoal, with a least depth of $24\frac{1}{2}$ feet, about $\frac{1}{4}$ mile northward.

(e) A shoal, with a least depth of 30 feet, about $\frac{1}{3}$ mile northeastward.

(f) A shoal, with a least depth of $33\frac{1}{2}$ feet, about $\frac{2}{3}$ mile north-northeastward.

Note.—Vessels with a draft greater than 16 feet should avoid the passage between Kabra Bemoek and Balbili Islands, and should pass southward of Balbili Island.

Tides.—At Oenaginim Islet, located near the middle of the strait $5\frac{1}{2}$ miles northeastward of Tanjong Waifkalettet and 1 mile eastward of Saloetoeen Pele, there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring highs and the

spring lows of the two tides do not coincide. The maximum rise and fall are about the same, namely, 1.3 to 1.6 feet above and below the mean sea level.

At the southern and northern entrances to the strait high water occurs, respectively, 3 hours earlier and one-half of an hour later than at Oenaginim Islet.

Tidal currents.—In the wide northern section of Sele Strait the tidal currents are not perceptible. In the narrow section at the southern end of the strait these currents may have a maximum velocity of 3 to 4 knots, but they cause no difficulty in navigating the strait.

6-78 Weather.—During the survey of Sele Strait, from July 1911 to March 1912, southerly and southeasterly winds of variable force were experienced during July and August. In September, October, and November the force of the wind decreased and periods of calm intervened. There were persistent light northerly and northwesterly winds during February and March. Westerly winds in February and March were occasionally accompanied by intermittent rain squalls, which were sometimes quite local and usually occurred at night or in the afternoon. The rainfall during the east monsoon is usually very slight. For more detailed general information see chapter 1.

6-79 Directions.—Vessels approaching from the south keep Tanjong Sele on the starboard bow until the western extremities of Membok and Peli are in range bearing 011° ; keep on this range until the south side of Tanjong Sele bears 090° , after which keep in midchannel through the narrows.

The northern portion can be navigated by various routes, but the following is the best: After passing Tanjong Waifkalettet steer eastward of Jef Nanas, Saloetoen Genan, and Segarau. A drying reef lies between Saloetoen Genan and Oenaginim. Passage to the westward of this reef, which is marked by a light beacon is recommended.

When past the light beacon that stands northward of Segarau, bring this light beacon in range $195\frac{1}{2}^{\circ}$, astern with the light beacon on Kamoomjel, and keep on this range until Mehil Islet, located about $4\frac{1}{2}$ miles north-eastward of Segarau, bears 100° . At this position alter course eastward to pass southward of and thence close eastward of Balbili Island, and when the light beacon on the western end of Wolo Genan comes in range 180° , astern, with the light beacon on the eastern point of Balbili Island, proceed northward on that range line. An alternate course, for vessels drawing 24 feet or less, is 057° , carried from the position with Mehil Islet bearing 100° , through the passage between Balbili and Kabra Bernock Island.

As Tsiol Island is approached proceed out of the strait between it and the Rombombo Islands.

Vessels bound for Sorong may pass to the southward of Nanah Island, or between Nanah and Tsiol; the former passage is preferable. A beacon with a black cylindrical topmark marks a drying reef that lies about 1,400 yards south-southeast of the southern extremity of Nanah. A stranded wreck lies on the southwest extremity of a reef $\frac{1}{2}$ mile southward of the beacon.

Vessels using the preferred passage should continue steering on the 180° range astern until the range beacons at Sorong come in range bearing $032^{\circ}30'$, and then steer for them on that heading. These courses lead close aboard a 21-foot patch lying $\frac{1}{2}$ mile eastward of the south end of Nanah Island. Care must be taken to avoid a 5-foot patch, not marked by discoloration, which lies about $\frac{1}{4}$ mile southeastward of the south extremity of Nanah.

A beacon surmounted by a red truncated cone marks the outermost edge of the reef lying eastward of Nanah Islet.

Instead of passing south of Balbili, vessels may continue to the northward through Sangailin Mon, the strait between Warir and Kabra, keeping in midchannel until well past the eastern point of Batimee. Thence bring the northernmost of the Sobrain Islands in range 198° with the eastern extremity of Batimee to clear the 1-fathom reef westward of the northern part of Kabra. When the north point of Kabra bears 090° steer 045° until the eastern extremities of Wolo and Balbili are in range; then proceed as directed in section 6-79.

There is also a route close along the east coast of Salawati; after passing Tanjong Kanelmelmak steer between Jef Mo and Salawati and follow the channel along Salawati through Lenna Strait. The northern part of this strait, however, is difficult, and the reefs are not easily seen. A rock, which dries, lies in midchannel about $1\frac{1}{2}$ miles southward of the northern entrance of Lenna Strait. Three beacons, each with a white triangular topmark, mark the northern entrance of this strait.

The eastern side of the strait is also navigable by keeping to the New Guinea coast after passing Tanjong Waifkalettet, along the south side of Kamoomjel and between Karabaik and Kararaboe; thence course should be set to the northward.

Mariners are strongly advised against entering the vicinity of Jawja Island between the parallels of $1^{\circ}00'$ S. and $1^{\circ}04'$ S., eastward of $131^{\circ}12'$ E. because of the numerous reefs and shoals encumbering the area.

6-80 WEST COAST OF NEW GUINEA.
—From Tanjong Sele, the western extremity of New Guinea, the coast trends in a southeasterly direction to McCluer Gulf. There are few conspicuous points along this densely timbered and uniformly low coast. Tanjong Jamtoep, located 31 miles eastward of Tanjong Sele, is clearly visible as far as Jef

Joes. Prominent marks are Tanjong Wamonket (Visschers Hoek) and Kobalin Islet. A beacon with a black and white vertically striped cubical topmark stands about 2 miles southeastward of Kobalin Islet. The two entrance points of Soengai Karabra are excellent landmarks. Along the northern part of this coast a low chain of hills is visible far inland, with higher mountains rising behind; in the far distance the high peaks of the Tamrau Mountains, situated near the north coast of New Guinea, may be seen on a clear day; this is particularly true when one is in the vicinity of Soengai Seremoek.

Several rivers hereafter described flow out in this portion of the coast; Soengai Karabra is the only one that breaks right through from the mountains. The other rivers, insofar as is known, flow in an east and west direction. A calm sea is desirable in attempting to enter the rivers because of the constantly changing depths in the channels leading to their mouths.

In the northern portion of this part of the coast, where the shore recedes near the mouths of Soengai Segoen, Soengai Kaiboos, and various other rivers, the 5-fathom curve runs 10 miles from the shore, and patches with as little as $1\frac{1}{4}$ fathoms over them are found outside the 10-fathom curve. In the southern portion it is advisable to remain at least 4 miles offshore in order to avoid the shoal patches inside the 5-fathom curve.

From Tanjong Sele the coast trends eastward for nearly 18 miles to Tanjong Wamonket; this part of the coast is low, but at the latter point it rises and is somewhat higher for a considerable distance eastward. Oempe Islet lies about 1 mile off Tanjong Kaledoko. Joes Genan Islet, about 2 miles west-northwestward of Tanjong Wamonket is separated from the coast by depths of $1\frac{1}{4}$ fathoms. A rock that dries and several shoal patches with depths of $\frac{1}{2}$ to 1 fathom lie inside the 5-fathom curve between these islets.

A light is shown from the northwest end of Oempe Islet.

the headlands and banks farther out at sea, but their mouths are accessible only to small craft of not more than 6-foot draft. Local knowledge of the trend of the channel across the bank which fronts the mouth and extends out to sea for 4 miles with depths of $1\frac{1}{4}$ to 2 fathoms enables vessels to reach the mouth of the Metamani, where there is a depth of $1\frac{3}{4}$ fathoms. The 3-, 5-, and 10-fathom curves off this bay are only about 600 yards apart; in the bay there are depths of 2 to 7 fathoms between the sand and mud flats.

Sungi Kais is 300 to 800 yards wide and has depths varying from $2\frac{1}{2}$ to 7 fathoms; nearly all the bends in the river are fairly wide. The banks of the river are low and marshy up to about 25 miles from the mouth. The water is fresh at the mouth of the river.

Southward of the sand flats off the mouths of the other two rivers there is a wide, deep entrance to Sungi Metamani. Depths of 6 fathoms were found in the river for a distance of 6 miles; the water was still salty at that distance. The banks are everywhere low and covered with mangroves.

In approaching Metamani Bay from the westward Tanjong Winsop and Tanjong Uaim first come into sight; the first-named point has a few scattered trees on it and is low; the latter point is higher and is covered with high trees, among which is one that is quite conspicuous. Tanjong Rur (Roer) is not seen until later; it has the appearance of a steep headland with trees on it. An 11-foot shoal lies about 26 miles westward of Metamani Bay; numerous reefs have been reported in the vicinity of this shoal. There is a rock bearing 258° , $4\frac{1}{2}$ miles, from Tandjoeng Uaim.

6-89 Coast.—From Metamani Bay the coast trends southeastward for 21 miles to Tanjong Sabra ($2^\circ 17' S.$, $132^\circ 17' E.$), at the entrance of McCluer Gulf. Midway along this part of the coast the Sungi Bira Sigaroi discharges; on the branches of this river are four villages. The houses of these villages are built on high piles and stand over mud

flats from which the mangroves have been cut away; at Bira, one of these villages, there is a Netherland Government agent. Mosquitoes and agas swarm in the headlands and banks farther out at sea, the river mouth is accessible only to small craft of not more than 6-foot draft. Local knowledge of the trend of the channel across the bank which fronts the mouth is essential. This region, named Bira, is thickly inhabited and is the principal sago country; the largest village has a population of about 1,000. The natives are seafaring people.

A mud and sandbank with depths of $\frac{1}{2}$ to $1\frac{1}{2}$ fathoms over it lies in front of the mouth of Sungi Sigaroi; a channel in which there is a depth of $1\frac{1}{2}$ fathoms leads through this bank. There are two unofficial beacons off the mouth of the river. Higher up the river there are depths of $2\frac{1}{2}$ to 6 fathoms.

A white spherical buoy is moored off the mouth of Sungi Sigaroi. Vessels entering the river should pass to the eastward of the buoy.

Near Tanjong Sabra there is a sandy beach with high trees. The point is conspicuous when seen from the west or northwest.

A light is shown on Tanjong Sabra.

6-90 McCLUER GULF (TELOK BE-RAU) is an extensive body of water that reaches to within about 16 miles of Geelvink Bay, thus almost isolating the northwest part of New Guinea.

The gulf is 23 miles wide at its entrance between Tanjong Sabra and Tanjong Salakiti, narrowing to 12 miles at the entrance of Bintoeni Gulf. The south shore for 35 miles east of Tanjong Salakiti is high and bold, but the rest of its shores are low and overgrown with mangroves. The region around the gulf is sparsely inhabited. Kokas village, situated on the south shore of Sekar Bay, is the principal trading center.

Several rivers, the entrances to which are blocked by mangrove-covered islands, empty into the gulf. The mountains on both sides

of the gulf lie so far inland that they are of no importance to navigation.

Soundings.—Close to the south side of the entrance of Bintoeni Gulf the soundings range from 10 to 50 fathoms, but farther northward they vary between 10 and 25 fathoms. Caution should be exercised in approaching the shoal parts of the coast of McCluer Gulf, inasmuch as mud banks with depths of 2 to 3 fathoms over them extend from the shore in many places.

6-91 Climate.—The climate in the vicinity of McCluer Gulf is very agreeable, with moderate rainfall and temperature. The nights are cool and the sea always calm, except for a few days during the west monsoon. Rain falls during the entire year, but the heaviest fall occurs in the change periods, April to May and October to November.

During the east monsoon the land winds are somewhat stronger, with a haze, sometimes accompanied by fog, hanging over the low coasts. The west monsoon is felt more, although it blows with only moderate force, because it may be accompanied by heavy squalls and gales; these storms, together with the strong currents, may be very inconvenient for boats and small craft.

Currents.—Tidal currents set into the gulf until the time of high water and out until low water. The maximum observed velocity of these currents, $2\frac{1}{2}$ knots, was in the deep channels between the banks along the south coast and in the vicinity of Ogar and Arguni Islands. On the north side of the gulf, particularly at low water, the discharge from the rivers sets up variable currents; this river water has a brownish-yellow color and, especially during the rainy season, can be seen for a great distance from the shore.

6-92 The north shore of McCluer Gulf consists mainly of low, marshy land, interrupted in places by patches of sand on which are clusters of trees. There are few conspicuous features; the headlands at the river

mouths are low, but they project well, and are useful marks for vessels coming from either the east or the west.

There is a conspicuous wood near Tarof village, about 8 miles northeastward of Tanjong Sabra. In the bight between this village and Sungei Kemudan, located 14 miles east-southeastward, there is a group of trees. The few villages are poor and insignificant, and the main occupation of the inhabitants is the gathering of sago; this product is grown chiefly on the north and east coasts of the gulf, and a constant traffic by native proas is maintained with the south coast.

On the north coast there are a number of creeks and streams; the most important of these are the Kemudan and Sebjar, both of which rise in the mountains. The low water depths on the bars at the entrances of these two rivers, respectively, 3 and $6\frac{1}{2}$ feet, but the depths in the river are considerably greater than that and the width for some miles up is about 200 yards. A wide bank fronts the mouth of the Kemudan and one of less extent lies at the entrance of the Sebjar; both banks are steep-to on the seaward side. The current in the lower reaches of the Kemudan has a rate of about 2 knots. The greater part of the banks of the Sebjar are submerged at high water; the river is fresh close to the mouth of the river.

A wide mud bank, outside of which the depths increase regularly, projects out all along this coast; farther out the depths are quite variable, probably due to channels worn in the bottom by tidal currents.

Close eastward of Tanjong Sabra, about 2 miles off-shore, there is a narrow, drying bank that is steep-to on the seaward side. A submerged rock lies about $\frac{1}{4}$ mile off the west end of this bank.

6-93 South shore of McCluer Gulf.—Tanjong Fatagar ($2^{\circ}46' S.$, $131^{\circ}56' E.$, H. O.

Chart 2980), the southern entrance point of McCluer Gulf, is the extremity of a thickly wooded peninsula of irregular outline which gradually rises to mountainous land; this mountainous background, however, has no conspicuous peaks. A $2\frac{1}{4}$ -fathom reef extends about $1\frac{1}{2}$ miles westward from the point. Strong rips set over and a considerable distance westward of the reef. The coast between Tanjong Fatagar and Telok Tawar is rocky and broken. Was Island, lying close to the shore 3 miles northeastward of Tanjong Fatagar, is an inhabited island 289 feet high. A drying rock lies just inside the line joining Fatagar and the northern extremity of Was. Sagemur Islet lies close to the shore about midway between Was and Telok Tawar. A 4-fathom shoal lies about 6 miles westward of the north end of Was Island.

Rumbati village is situated close westward of Telok Tawar, hidden behind a rocky headland; vessels coming from the westward do not sight this village until they have passed it. The only building which does not stand on piles in the water is the mosque, which is located on the beach.

6-94 Telok Tawar, situated $6\frac{1}{4}$ miles eastward of Tanjong Fatagar, is a small and unimportant inlet which is unsafe during the northwest monsoon. The entrance between the 6-fathom curves is about one-fourth of a mile wide. The fairway lies about midway between the entrance points. The inlet is $6\frac{1}{2}$ fathoms deep, but shoals extend about one-half of a mile from its southern shore and about one-fourth of a mile from its eastern and western shores.

6-95 Salakiti Bay affords a safe anchorage for large vessels at all times; some small rocks and islets on the northern side of the entrance form a natural breakwater. The depths at the entrance and inside the bay range from $7\frac{1}{2}$ to $8\frac{3}{4}$ fathoms. In the southern part of the bay some small islets lie on the drying coast reef; behind them is a shallow basin, surrounded by mangroves, which

also front the main shore. A few huts stand on the rising hilly land that forms the greater part of the shores of the bay.

6-96 Patipi, a fairly prosperous village, is situated in a shoal basin that nearly dries at low water and is sheltered from wind and sea by the high, rocky islands on the north side of Salakiti Bay. The houses are built on piles in the water; at low tide there is sufficient water around the houses for the trading proas to remain afloat.

6-97 Patipi Bay (Solat Len) (*H. O. Chart 2980*) penetrates the coast in an easterly direction for about 5 miles, with a maximum width of about 2 miles, narrowing gradually towards its head. It can easily be recognized from seaward by the straight direction of its shores and also by a round hill, 417 feet high, on Tanjong Kramram, the southern entrance point, which shows up dark against the land behind. Tanjong Osir, the northern entrance point, is low and rocky. Off the entrance there is frequently a strong tidal current with swirls that are caused by the meeting of the currents along the coast with those setting out of the bay.

The north shore of the bay is steep-to and can be approached closely. The southern shore, which is irregular, is covered with mangroves behind which the land rises steeply; the inlets on this shore have broad coastal reefs on which there are occasional islets and rocks.

The bay is quite clear except for the shore reef and a single detached drying rock close to the south coast, about 600 yards north-northeastward of Perwa Islet, $3\frac{1}{2}$ miles eastward of Tanjong Kramram. The depths at the entrance and within the bay range from 6 to 10 fathoms, decreasing gradually toward the head. The bay affords anchorage protected against all winds.

Eastward of the rocky islets at the head of the bay, the largest of which, named

KOKAS VILLAGE

Bunoha, is overgrown, is a steep-to mud-bank that extends out from the shore; a boat channel leads through this bank and along the north coast to a mountain stream named Degen. Along the shores of the bay there are groups of two or three houses, built on piles between projecting headlands, and on the slopes are plots of land where tobacco, sugarcane, bananas, and other products are grown; the inhabitants are more numerous and prosperous here than along other parts of the coast.

6-98 Coast.—From Tanjong Wetin ($2^{\circ}42'$ S., $132^{\circ}05'E.$), at the northern entrance to Patipi Bay, the coast trends northeastward $2\frac{1}{2}$ miles to Tanjong Salakiti and then turns to the eastward for $18\frac{1}{2}$ miles to Tanjong Sekar. The land rises gradually from the spit that forms the north side of Patipi Bay to heights of more than 2,000 feet. The coast is rocky with a few shallow inlets obstructed by reefs. Close inshore about $3\frac{1}{4}$ miles eastward of Tanjong Salakiti is Angululi Islet, which is difficult to make out from seaward.

6-99 Sekar Bay is afforded good protection from wind and sea by the islands off its entrance. Mud brought down by the Kaiuni River has shoaled the entire bay, but this shoal area ends abruptly at the entrance; the depths outside the entrance increase rapidly from 3 to 4 fathoms to 30 fathoms. A large sandbank, over which the least depths are 2 fathoms and which is subject to change when the Kaiuni River is in flood, lies near the western side of the entrance; westward of this bank there is a deep channel that leads along Tanjong Sekar to Kokas village, the western entrance point. The eastern part of the bay is so shallow that it has no navigational importance whatever.

6-100 Kokas Road, comprising the greater part of the western arm of Sekar Bay, is bounded by a line drawn in a 090° direction through the point of the spit eastward of Kokas, and by the arc of a circle with a radius of 1,367 yards, centered on the head of the pier that projects out from the shore abreast the village. A light is shown from a mast on the pierhead at Kokas. A seaplane mooring buoy is located 600 yards northwestward of the pierhead. Vessels can anchor in 4 fathoms about 200 yards from the pier. When making this anchorage a course of 182° on the jetty, or 185° on the Government official's house that stands on a hill and is marked by a flagstaff on the chart, will lead through the channel between Tanjong Sekar and the 2-fathom sandbank. Tanjong Sekar can be passed close-to.

Tides—Currents.—At Kokas village there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring lows of the two tides can almost coincide, producing in May and November, a maximum fall of $5\frac{1}{2}$ feet below the mean level. The highest rise that can be expected is $2\frac{3}{4}$ feet above the mean level.

Tidal currents, particularly in the inner part of the bay, are weak.

6-101 Kokas Village ($2^{\circ}42'S.$, $132^{\circ}25'E.$), located on the south side of the western arm of Sekar Bay, is the trading center for McCluer Gulf and is frequented by Chinese and Arab traders. It is the place of residence of a Netherland government agent. Fronting the village is a pier for small vessels; there is less than 6 feet at the head of the pier.

6-102 Islands off Sekar Bay.—Ogar Island, 745 feet high, is the largest of a group of high, steep, and densely wooded islands

that extends nearly 11 miles eastward from West Island, the westernmost island of the group, along the coast off Sekar Bay. The only signs of habitation on the islands of this group are on the largest of the Sariga Islands, lying westward of Ogar, Sekan village on Ogar, and a village on the south coast of Arguni. This latter village is marked by a mosque.

Southward of Ogar and Arguni there is a channel that leads to Sekar Bay. On the southern side of this channel, abreast Ogar, are a number of high islets which greatly obstruct the channel, leaving only narrow passages; the widest of these passages, running along the steep shore of Ogar, has strong currents and overfalls.

Reefs.—Two reefs, one with a depth of 3 feet over it and the other with $2\frac{3}{4}$ fathoms, lie, respectively, $2\frac{3}{4}$ miles and 1 mile west-northwestward of West Island. Neither of these reefs is marked by discoloration.

Currents.—In the channels and along the islands referred to above the tidal currents are similar to the general currents in the gulf (sec. 6-91). In the narrower parts of these channels the currents sometimes attain a rate of 3 knots. The flood current moving up McCluer Gulf divides at West Island, causing heavy tide rips in that vicinity. One part of the current sets through the channel along the south sides of Ogar and Arguni, the other part sets eastward along the north sides of these islands.

6-103 Directions.—Vessels proceeding to Kokas from the eastward can easily recognize Arguni Island; its easterly hill, 330 feet high, is very conspicuous, with a sugar-loaf summit which stands up darkly against the surrounding land. Make for the wide eastern entrance of the channel southward of Arguni on a course of 280° , steering for the

highest part of Ogar ($2^\circ 40' S.$, $132^\circ 28' E.$); this round summit is very conspicuous. On this course, which should be held until well past Arguni, the group of islets southward of Ogar will be seen slightly on the port bow and will appear to close the channel. When Dwars in den Weg, the northwesternmost of the islets southward of Ogar, appears fully open in the western entrance of the strait, steer for it; when up to this islet proceed along the Ogar side of the channel until the wide entrance to Sekar Bay is seen ahead. The 2-fathom sandbank near the western side of the entrance to the bay must be given a good berth. The course should first be set on Tanjong Sekar, after which the directions previously given for Kokas Road should be followed.

6-104 Coast.—Eastward of Sekar Bay the densely wooded coast consists of steep limestone cliffs that rise sheer from the sea. A number of sugar-loaf summits, many of which have been burned over, leaving only bare charred trees, give to the land a singular appearance. There are white patches in places on the cliffs. Caves and tunnels have been worn in the rocks, giving the coast an arresting aspect; in the vaults thus formed the natives bury their dead.

The mountainous land runs parallel with the coast, the highest point rising to 1,532 feet, but the summit is not conspicuous. At the back of this coastal ridge there is a wide valley and beyond that is the central range of the peninsula; the latter range attains a maximum elevation of 4,757 feet, but it also has no conspicuous summits.

Rocky wooded islets are scattered along the coast, concealing the insignificant settlements behind them. Goras located 14 miles southeastward of Tanjong Taramnoesa, is the principal village.

BINTOENI GULF

6-105 Batu Lajar ($2^{\circ}44'S.$, $132^{\circ}28'E.$), a rock about one-half mile from the shore, near Darembang village, is very conspicuous from the northwestward, rising from the sea like an obelisk; when seen from a distance it bears a marked resemblance to a proa under sail.

The depths gradually decrease to the eastward; off Goras the 3-fathom curve is more than a mile from shore. Between Goras and Tanjong Tanah Merah, 33 miles to the north-eastward, access to the coast is rendered difficult by a wide mud-bank; the 3-fathom curve along this bank runs nearly straight from a position 5 miles northward of Goras to about one-half of a mile northward of Tanjong Tanah Merah. Outside this bank there are numerous patches of $1\frac{1}{2}$ to 5 fathoms, extending to a distance of 9 miles from the shore, with deep channels between them; the chart must be consulted for further information. The outermost shoal, with a depth of $3\frac{3}{4}$ fathoms over it, lies $13\frac{1}{2}$ miles northward of Goras.

Near Goras the mountainous aspect of the coast ceases abruptly; the mountains recede far inland and the intervening land consists of mangrove-covered marshes that are intersected by numerous creeks and streams. The most important of these streams are the Bedidi and Bomberai, both of which discharge close together in the southern part of the large bight formed between Sekar Bay and Tanjong Tanah Merah; they have their sources in the mountains and provide a means of communicating with the interior. A bar that dries obstructs the mouths of these rivers, but, since the tidal range is 8 feet, they are navigable by boats and small craft. The Bedidi is fully 300 yards wide at its mouth. There are a few insignificant villages between Goras and Tanjong Tanah Merah.

Light.—A light is shown from Tanjong Tanah Merah.

6-106 BINTOENI GULF.—The entrance of Bintoeni Gulf, the eastern extension of McCluer Gulf, is 12 miles wide and is fringed on both sides by low, marshy land, above which rises a small group of hills, 259 feet high, on the southern side of Tanjong Tanah Merah. These hills, which are of reddish loam and bare on their seaward sides, constitute a mark for vessels approaching from the westward. Mountain land is visible to the northward and eastward.

A great number of small rivers flow into the north side of the gulf. This part of the coast is fronted by a steep mud bank, generally about 2 miles wide, through which some of the rivers have cut moderately deep channels. In the eastern portion salt water creeks run far inland.

Inside the entrance the character of the south coast changes; the low marshy land continues but it is intersected by wide salt water creeks, and scarcely any land is visible. Fronting the south shore are the mangrove-covered islands Asap ($2^{\circ}28'S.$, $133^{\circ}19'E.$), Amutu Besar, and Amutu Kechil, all of which are separated from the mainland by navigable channels.

The head of the gulf is hilly and is fronted by a strip of mangroves. Salt water creeks run far inland. There is one village at the head of the gulf. The north shore has few inhabitants, but the south shore is fairly well populated.

There are no dangers in Bintoeni Gulf, and vessels can steer by bearings on the headlands and hills at the head of the gulf. Steenkool Berg and Sigemerai, on the north side of the gulf, are conspicuous; the latter has two slightly pointed summits 1,762 and 1,712 feet high. At the head of the gulf the Suwuri Range, 2,274 feet high, and Top Modan, 928 feet high, are conspicuous. Ta-

warei, with a round summit, 2,156 feet high, Tantiri, with two sharp peaks, 2,080 feet high, Nusawammer, 912 feet high, and Maniai, 535 feet high, are also good marks. The more distant mountains are seldom visible.

6-107 The weather is nearly always fine in Bintoeni Gulf; persistent rain does not occur in either monsoon. During the survey season in 1913 the rainfall was heaviest at the beginning of the east monsoon, diminishing steadily from then on. The west monsoon set in suddenly at the beginning of November. The east monsoon brings cloud and rain squalls off the land and much lower temperatures. During the east monsoon the direction of the wind is between southeast and southwest, and during the west monsoon it is between southwest and northwest.

Tides and tidal currents.—At the entrance to Bintoeni Gulf the tide has a range of about 8 feet, and at the head of the gulf 22 feet; this great difference in range causes strong tidal currents that follow the direction of the coast. The maximum rate is about 3 knots. The direction of the current changes at about the time of high and low water.

Close within the mouth of the Sungai Muturi the tides are semi-diurnal. The ingoing and outgoing tidal currents set in the direction 070° and 250° , respectively. The currents are equally strong, attaining a maximum velocity of $1\frac{1}{4}$ knots at springs.

6-108 **North shore of Bintoeni Gulf.**—Many rivers empty into the north side of the gulf; the most important of these are the Kamarin, the Rittowé, and the Wasian. Since there are no landmarks at the mouths of these rivers, vessels intending to enter them must depend on bearings taken on the very conspicuous Sigemerai Mountain ($2^{\circ}02'S.$, $133^{\circ}36'E.$), the two pointed summits of which are visible throughout the gulf. In the eastern portion of the gulf there are no actual river mouths, but long arms of the sea, into which the rivers discharge, penetrate far inland.

6-109 Sungai Kamarin ($2^{\circ}12'S.$, $133^{\circ}16'E.$) can be entered on an 008° course, steer-

ing for the west entrance point; the least depth on this course is 5 feet. Inside the mouth the stream immediately splits into two branches and becomes very narrow.

The Rittowe winds to the westward. Local knowledge is necessary for entering this river. There is a least depth of 4 fathoms in the channel.

The Wasian has a straight channel with a least depth of 2 fathoms on the bar (1951). To enter this river a course of 020° should be set on the center of the mouth. The least depths are found half-way across the coastal bank; farther in they increase rapidly.

About $4\frac{1}{2}$ miles inward from the bar, the Wasian River bifurcates into two broad streams, one trending northward and the other eastward. About 8 miles above the bifurcation, on the north trending branch, and about 12 miles above the mouth of the Wasian River, is the settlement of Steenkool.

Caution.—Vessels are cautioned against navigating above the bight located northwestward of Steenkool village because of the existence of wrecks, the positions of which are unknown.

Light Buoy.—A light buoy, painted in black and white vertical stripes, is moored in the estuary, 2 miles southward of the mouth of the Wasian River.

Steenkool is a Netherlands petroleum port. There is a hospital here. Supplies of any consequence are unobtainable. There are two aircraft mooring buoys in the river off the village. There is a 360-foot concrete jetty along the east bank, above Steenkool. It has a least depth of about 18 feet alongside. It can accommodate vessels up to 270 feet in length and with a draft of 14 feet. A motor crane of 5-ton lifting capacity and a fixed crane of 20-ton capacity are available. Bunker oil is obtainable.

Sungai Muturi is the westernmost of the salt water inlets that occupy the greater part of the eastern end of the gulf; at a distance of 6 miles from its entrance the narrow winding Sungai Komano discharges into the inlet. The Komano is navigable by fairly

large proas to Muturi village, a local trading center.

The approach to Sungai Muturi is aided by the conspicuous Tanjong Kabarisi on the eastern side of the approach, and the Sigemerai summits. A spit, with a depth of about $3\frac{3}{4}$ fathoms, projects west-southwestward from Tanjong Kabarisi, for about $5\frac{1}{2}$ miles.

Buoys.—A conical buoy, painted in black and white bands, and topmarked by a black cone, is moored at the west end of the above mentioned spit. The first reach is marked on the northwest side by a can buoy, painted in red and black horizontal bands, topmarked by a black truncated cone.

Vessels should pass northward of the buoy located on the end of the spit about $5\frac{1}{2}$ miles west-southwestward of Tanjong Kabarisi.

Muturi (Moetoeri) is a deep water oil terminal located about 3 miles within the entrance of the Sungai Muturi. An oil jetty with a T-head about 60 feet long and 20 feet wide

has a depth of 45 feet alongside. It is designed to accommodate tankers of 30,000 gross tons, 660 feet long, and 85 feet wide, with a draft of 35 feet. There are four dolphins and three mooring posts available to assist in docking. The jetty is lighted and has a 1-ton hose derrick and a 24-inch hose line. Two 5-ton cranes are available.

A mooring launch is available. Crude oil for bunkers may be obtained. There is radio-telephone communication with Steenkool. A small hospital is located at Muturi.

Pilotage is compulsory for the Muturi River for vessels of 50 registered tons or more unless exempted by permission of the harbor-master at Sorong. Pilotage by night is performed only by special arrangement. The estimated time of arrival at the outer buoy should be communicated to the coastal station at Hollandia at least 24 hours in advance when requesting a pilot. The harbormaster of Sorong performs pilotage on the Muturi River to and from Muturi Terminal.



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6-110 South shore of Bintoeni Gulf.—The directions given below can be followed for navigating the south shore of the gulf and the salt-water creeks that discharge there. The fact should be borne in mind that all the headlands are low and that, therefore, the great range of tide in the eastern portion of the gulf makes a very material difference in their appearance at high and low water. The muddy points are, in some cases, covered with very low mangroves which make them difficult to identify. The main rivers, from west to east, are the Kasuri, Kasira, and Kaitero.

6-111 Sungai Kasuri ($2^{\circ}30' S.$, $133^{\circ}22' E.$, *H. O. Chart 2980*).—Vessels making for Sungai Kasuri steer on the southwest point of Sianiri Kechil on course 142° after rounding Asap Islet; on this course the wide mouth of Sungai Kasuri will gradually become more open. A course of 185° on Tanjong Aroba, located on the west bank of the inlet $9\frac{1}{2}$ miles southward of the southeastern end of Asap, in range with the point on the opposite shore of the river, leads between the shoals in the mouth. The navigation of the inlet presents no difficulties.

From the westward a shorter route to the Kasuri is through Sungi Tanusan Wimara, but the channel through the shoals which front the coast is not easy to follow; this passage is narrow and has steep sides. Since there are no marks and the currents set across the channel, it is advisable to obtain local knowledge before attempting the channel. Near the point of junction with the Kasuri the southern shore should be favored.

Sungi Senindara, which flows into the Tanusan Wimara, has a wide mouth, but it becomes much narrower above the first bend. A steep-to bank extends from Asap to a position opposite the eastern side of the entrance of Sungi Senindara.

6-112 Sungi Kasira.—After rounding

Asap Islet vessels bound for Sungi Kasira, the next inlet eastward of Sungai Kasuri, steer a course of 118° on the southwest point of Amutu Besar, and, when the western extremity of Sianiri Kechil is on the starboard beam, alter course gradually to the southward so as to bring the second point on the east bank of Sungi Kasira to bear 175° . Steer toward the point on this bearing until the channel between Sianiri Kechil and Sianiri Besar bears 270° , after which the Kasira may be entered on a southerly course. Vessels leaving Sungi Kasira should favor the eastern shore.

Wreck.—A dangerous wreck lies near the eastern entrance point of Sungi Kasira.

6-113 Babo, a large village lying on the eastern side of Sianiri Besar, is fronted by a stout wooden pier with a shed at the end. This pier is suitable only for boats. About three-fourths of a mile farther northward is an L-shaped pier, with a depth of 26 feet alongside its head. A European representative of the government resides at this village.

6-114 Sungai Kaitero, located eastward of Amutu Besar, is the most important inlet on the southern side of Bintoeni Gulf. Its upper reaches are well populated. From near the mouth the higher land behind the marshes may be seen. Amutu Kechil divides the entrance into two channels. The eastern passage is narrow and shoal, but the western one is wide and deep. Outside the entrance the approach is divided by Amutu Besar; the northern branch, named Taridura, leads between Amutu Besar and Amutu Kechil, and the western branch leads southward of Amutu Besar.

Vessels approaching Sungai Kaitero by the western passage should enter the wide channel southwestward of Amutu Besar on

bearings and then steer a course of 110° on the southern extremity of this island; this course will lead between the shoals in the eastern part of the channel. After passing close along this southern point steer straight for Amutu Kechil, and then proceed into the Kaitero on a south-southeasterly course. The first bluff on the west side of the river should be passed close to on account of the drying banks which lie in midchannel.

Vessels using the Taridura Channel should steer 126° on the northeast point of Amutu Kechil, changing course to 170° when the eastern extremity of Amutu Besar bears 180° ; this latter course leads through the deepest part of the Taridura and close along the shore of Amutu Besar. The western side of the channel is steep to; the eastern side shoals more gradually. When abreast the west point of Amutu Kechil the shore of this island should be followed; beyond that the directions previously given should be followed.

Vessels leaving Sungai Kaitero through the channel leading southward of Amutu Besar can, after rounding the southern extremity of that island, proceed out on a northwesterly course, keeping the southern end of Amutu Besar bearing 110° , until northeastward of Siamiri Kechil. Vessels in this channel can, if the visibility is good, make out Asap Island, in which case they can bring the northern point of that island to bear 293° and steer for it.

6-115 Coast.—A wide bank extends across the head of the gulf between Amutu Kechil to abreast the mouth of Sungi Bakor; the southern part of this bank, particularly abreast the mouths of the Wagura ($2^{\circ}31' S.$, $133^{\circ}44' E.$, *H. O. Chart 2980*), Weperar, Wemai, and Aramasa Rivers, is quite shoal, but through the northern part there are a number of channels. There are several drying patches on this bank. The bank can be avoided by keeping Top Modan bearing more than 090° .

6-116 Modan Strait, leading along the southern side of Modan Island, gives access,

by inland water routes and a system of trails, to the interior and to Geelvink Bay, across the narrow isthmus of the peninsula. The strait is entered over a bar with less than $2\frac{3}{4}$ fathoms by steering a course of 095° on Top Modan; the least depth on this course is $2\frac{1}{2}$ fathoms. Southward of the line of this course the depths decrease regularly; close northward of it they decrease sharply. Eastward of a position abreast the western end of Modan there is deep water across the whole breadth of the channel. The north bank rises steeply and is rocky, but the south bank is low and covered with mangroves. Anchorage can be taken in a depth of 11 fathoms in the strait abreast Modan village.

Tides.—At Modan village there is both a diurnal and a semidiurnal tide, but the latter predominates. The spring highs and the spring lows of the two tides do not coincide. The highest water level occurs in June or July and December or January, the lowest in March or April and September or October. The maximum rise and fall that can be expected are, respectively, about $9\frac{1}{2}$ feet above and $12\frac{3}{4}$ feet below mean sea level.

6-117 Modan Village extends over two slight bends in the north shore of Modan Strait. Most of the houses are built on piles in the water, but the residence of a representative of the Netherland Government is situated on a flat level portion of the steeply rising land.

6-118 Nusawammer Strait runs between the island of that name and Maniai Island, about 4 miles northward of Modan Island. The strait leads eastward along the south side of Maniai and then turns sharply to the northward along the east end of that island. On a mud bank that extends in a westerly direction from Nusawammer Island are two mangrove clumps that look like islets; the western clump is named Karaka. The entrance of the strait leads along the northern side of this bank. Northward of the western extremity of the bank is a bar on which there is a least depth of 2 fathoms.

Karaka and the summits at the head of the gulf constitute good marks for clearing

the bank that extends out from Tanjong Kabarisi, eastward of the entrance to Sungai Muturi. With good visibility the rocky islet, Srewenu, lying in the middle of the strait southward of Maniai, may be steered for on an easterly bearing. Vessels must pass northward of Srewenu. Beyond that islet the channel narrows considerably.

6-119 Pisang Islands lie about 20 miles west-northwestward of Tanjong Fatagar. The group consists of the long, narrow Saboeda Island, several islets southward of that island, and the two massive rocks, Tartaruga and Senchan ($2^{\circ}36'S.$, $131^{\circ}33'E.$), north-westward of Saboeda. The islands of the group, rising steeply from depths of 40 to 60 fathoms, are hill, heavily wooded, and uninhabited. The maximum elevation, 538 feet, is in the middle of Saboeda. A narrow reef extends off this island, widening to 200 yards off the southwest point. Senchan, the outer of the rocks that lie northwestward of Saboeda, is 154 feet high, and Tartaruga is 197 feet high; both are surrounded by coastal reefs. On the northeast side of Tartaruga there is an entrance in the reef through which vessels can proceed to the islet in depths of 7 fathoms. A number of reefs lie around these islets, and the utmost caution must be observed when passing between Saboeda and Tartaruga. The channel between Saboeda and the islets to the southward is quite clear, as is also the area between the Pisang Islands and the 2-fathom reef off Tanjong Fatagar. A small $2\frac{3}{4}$ -fathom shoal lies $2\frac{3}{4}$ miles northwest-by-west of Senchan Islet.

Light.—A light is shown from a white tower, 49 feet high, located on the northeast-end of Saboeda Island.

During the southeast monsoon the best anchorage in this group is on the north side of Saboeda. In the northwest monsoon the most sheltered anchorage is close to the southern shore of that island; vessels will also be fairly well-protected in this latter anchorage during the southeast monsoon.

6-120 THE COAST OF NEW GUINEA from Tanjong Fatajar to Cape van den Bosch is high, densely wooded, mountainous land that normally terminates in steep, rocky cliffs. The east coast of Sebakor Bay is, however, considerably lower, with an upward gradient, dipping at intervals, and forming a division between the mountainous Kumawa territory and that lying northward of Sebakor Bay.

There are few conspicuous landmarks on this coast; Gunung Baik, 3,452 feet high, located close southward of Sebakor Bay, affords a good mark, and the rather sharply pointed peak, 3,301 feet high, lying 4 miles northward of Cape van den Bosch, is also conspicuous. Along this coast there are a few streams, nearly all of which dry at low water and are navigable only by small native craft. In the vicinity of Fak Fak there is a fair amount of trade in forest produce, but in the southern portion, between Tanjong Tongerai and Cape van den Bosch, there are no signs of human habitation.

Inasmuch as the southeast monsoon blows mainly in the direction of the coast, there is little protection from the swell except inside deep bays or behind projecting headlands. In Sebakor Bay, due probably to the influence of the lower land, the east monsoon is felt mainly in a direction northward of east.

Tidal currents.—The flood currents along this coast set to the north and the ebb to the south, but both are weak.

The coast between Tanjong Fatagar and Tanjong Kokraaf is very irregular and forms two bays that are separated from each other by the very conspicuous Tanjong Tegin. The northern bay is named Wirtopin and the southern bay, Suweri; they are both inhabited and of little importance.

6-121 Batoepoetih (Batu Putih) ($2^{\circ}57'S.$, $131^{\circ}58'E.$), lying close southward of Tanjong Kokraaf, is a rocky wooded island about 2 miles long east and west and 509 feet high. It is of limestone formation and

has conspicuous white patches; the west point, in particular, is a striking headland with steep white cliffs. A coral patch over which there is a least depth of 16 feet lies northward of the island. A $6\frac{1}{2}$ -fathom shoal was reported to lie about $\frac{1}{2}$ mile west-northwestward of the 16-foot patch. The least depth in the fairway of the passage between Batoepoetih and Tanjong Kokraaf is $6\frac{1}{2}$ fathoms.

6-122 Coast.—Telok Togarwatan and Telok Sipatnanam, lying immediately eastward of Tanjong Kokraaf, are separated by Tanjong Gangrurimur, on the eastern side of which is a cascade of fresh water; they afford safe anchorage in the west monsoon, but are of no importance otherwise. A dangerous sunken rock lies off the eastern shore of Telok Sipatnanam about $1\frac{1}{4}$ miles east-northeastward of the extremity of Tanjong Gangrurimur.

A detached reef, with a depth of $3\frac{1}{2}$ fathoms, lies off the head of Telok Sipatnanam. The reef is parallel with the coast, from which it is separated by a deep channel, about 200 yards long and 33 yards wide.

During the east monsoon there is safe anchorage northward of Batoepoetih.

Between Tanjong Ributtutin and Fak Fak, a rather wide coral bank, covered in most places with fine sand, extends out from the coast. The chief settlements along this coast are Attiatti Onin and Werpigang. The houses of these villages are built on piles in shallow water or on patches that dry at low water and are connected with the shore by bamboo bridges that are sometimes more than 100 yards in length.

6-123 Ekka Island, extending about 2 miles eastward of a position $1\frac{1}{2}$ miles southeastward of Tanjong Ributtutin, is a narrow, rocky, wooded island with a white beach. This island, which is only temporarily inhabited, has numerous remarkable white patches on it. A reef extends out about one-half of a mile from the east point of Ekka.

On an extensive reef between the island and the mainland are the several small, low, wooded, and uninhabited Tipporra Islets. Vessels lacking local knowledge should not attempt the deep channel between Ekka and the reef surrounding Tipporra Islets.

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6-124 Pandjang Island, lying about $1\frac{1}{2}$ miles eastward of Ekka Island and separated from it by a deep channel, is narrow and $9\frac{1}{2}$ miles in length east and west. A narrow ridge of hills, the slopes of which are gradually being put under cultivation, runs along its entire length. Reefs extend 275 yards from the west and 550 yards from the east end of the island. The channel between the eastern extremity of Pandjang and the mainland coast is clear.

Light.—A light is shown from a white iron framework structure 43 feet high, situated on Tanjong Wamarusa, the eastern end of Pandjang Island.

Dangers.—Several reefs lie southward of the eastern part of Pandjang Island. Egeron Reef has a least depth of 1 fathom and is about one-half of a mile long by 200 yards wide; on the other reefs there are depths of $1\frac{1}{4}$ to $3\frac{3}{4}$ fathoms. They all lie westward of the meridian of Pandjang Light and northward of a line drawn in a 276° direction through the highest point of Semai.

A $3\frac{3}{4}$ -fathom shoal lies on the 100-fathom curve, about 7 miles southwest of the east end of Pandjang Island.

Between Semai Island and the east point of Pandjang are two reefs of 8 feet and less than 6 feet; these reefs discolor well in favorable light.

Directions.—The channel east of Pandjang is clear of dangers, but the reefs southward of the lighthouse must be carefully avoided. Vessels approaching Tanjong Wamarusa from the westward can pass it to within one-half of a mile on an easterly course. The reefs show up by discoloration if the light is good. Vessels approaching from the south should steer for the lighthouse on a course between 320° and 347° . The lighthouse point can be rounded at a distance of one-half of a mile. A good range is with the southern point of Tubi Serang Islet in line $327\frac{1}{2}^\circ$ with the flagstaff at Fak Fak.

6-125 FAK FAK ROAD ($2^\circ 57' S.$, $132^\circ 17' E.$), located at the eastern end of the channel northward of Pandjang, between Metti Metti Reef and Tubi Serang Islet, is sheltered by Pandjang Island, but a heavy