

Tanjong Kadua, the west end of a small islet close offshore, and Tanjong Tiga Papan lie about $2\frac{1}{2}$ and $3\frac{1}{4}$ miles, respectively, north-northeastward of Tanjong Bangau. Tanjong Tiga Papan rises to a height of 440 feet about $\frac{1}{2}$ mile eastward of its extremity.

The northwestern coast of Borneo terminates at Tanjong Sempang Mangayau, 200 feet high and readily distinguished by its grassy bluff.

10-163 OUTLYING ISLANDS AND DANGERS.—The outlying shoals lying off the northwest coast of Borneo continue in a general northeasterly direction from Vernon Banks (see sec. 10-105) and terminate in Big Bonanza Shoal, lying about 18 miles westward of Tanjong Sempang Mangayau, the northern extremity of Borneo. Many of those shoals have only been partially examined

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and shoaler water than charted may be found. Vessels should normally move up and down the northwest coast of Borneo by passing through Tiga Channel (see sec. 10-110), and keeping well inshore of these outlying dangers.

Saracen Bank lies about 27 miles northwestward of Pulau Tiga and is an extensive coral bank, with general depths of 3 to 5 fathoms, on which there are many rocks above and below water. The bank is used by fisherman who erect frames for drying fish on parts of the foul ground.

A drilling platform is located near the southeast and northwest end, respectively, of Saracen Bank. At night, working lights may be obscured on these platforms.

Dampier Shoals, with depths of $3\frac{1}{2}$ to 10 fathoms, extend southeastward from Saracen Bank for about 18 miles, and terminate in Hayter Shoal. The latter, with depths of $4\frac{1}{4}$ fathoms, lies about 10 miles north-northwestward of Pulau Tiga. A detached $5\frac{3}{4}$ -fathom patch lies about $\frac{3}{4}$ mile southward of Haytu Shoal. Passage through these waters should not be attempted except during daylight and good visibility. Soundings give very little warning of approach to the shoals. The least depth of $3\frac{1}{2}$ fathoms on Dampier Shoals lies 10 miles southwestward of Pulau Mengalum.

A 15-fathom bank lies about 20 miles westward of Saracen Bank, and about $4\frac{1}{2}$ to $5\frac{1}{2}$ miles outside the charted 100-fathom curve, but its exact position was reported doubtful (1950). It was not found within 5 miles of its charted position in 1956.

10-164 Pulau Mengalum ($6^{\circ}12' N.$, $115^{\circ}36' E.$), about 28 $\frac{1}{2}$ miles westward of Gaya Head (see sec. 10-122), is circular in shape and about 1 $\frac{1}{2}$ miles in diameter. The land is very low, the highest part being only a few feet above the level of the sea. The trees attain a height of 170 feet and are conspicuous. The island is surrounded by a coral reef, broken only at the southeastern portion.

Reefs extend to about 2 $\frac{1}{4}$ miles southwestward from the island, and shoals, with depths of less than 6 fathoms, extend about 1 $\frac{3}{4}$ miles farther westward from these reefs. There are coral patches, with depths of 4 to 6 fathoms, lying within an area 4 $\frac{1}{4}$ miles westward and

northwestward of the southwestern point of the island. A shoal area about 3 miles northward of the island extends about 2 miles in an east and west direction and has a greatest breadth of about 1 $\frac{1}{2}$ miles. From the northeastern end of the island, rocks on which the seas break, and coral patches, with least depths of 2 fathoms, extend about 2 miles in a northeasterly and easterly direction, 3 miles in a northerly direction, and about 1 $\frac{1}{2}$ miles in a southeasterly direction. Shoal water with least depths of $4\frac{1}{4}$ fathoms is also reported to extend about 10 miles east-northeastward from the island. A depth of 5 $\frac{1}{2}$ fathoms exists about 11 miles southwestward of the southern extremity of Pulau Mengalum.

10-165 Anchorage and landings.—Vessels can anchor close off the southeastern end of Pulau Mengalum, but must keep a good lookout for shoals. The best landing places are eastward of Tanjong Yu, its southern extremity, or close southward of Tanjong Kring, its eastern extremity.

Caution.—The area described above has not been closely examined and unknown dangers may exist.

Rizal Shoal, an extensive horseshoe-shaped shoal area, with depths of less than 6 fathoms, extends 5 $\frac{1}{2}$ miles in a northerly direction and 3 $\frac{1}{2}$ miles in a westerly direction from a position about 6 miles westward of Pulau Mengalum. It has a greatest width of about 4 $\frac{1}{2}$ miles. A tongue of water with general depths of 7 fathoms extends about 3 $\frac{1}{2}$ miles into this shoal from the south and has a greatest width of about 1 $\frac{1}{4}$ miles. The least depth found on this shoal is 3 $\frac{3}{4}$ fathoms and is located near its steep-to western side. The southern limits of this shoal have not been definitely established.

10-166 SUNKEN BARRIER SHOALS are a chain of coral formations with depths of $2\frac{1}{2}$ to 9 fathoms, and with deep water between them, lying between Pulau Mengalum and the Mantanini Islands, about 56 miles northeastward. These shoals are plainly visible, but vessels should not attempt to cross over them as it is very probable that shoaler water than charted may exist. The passage between them and the mainland, about 16 miles southeastward, is believed to be clear of outlying dangers beyond a distance of 5 miles from the coast.

The southernmost of these shoals consists of an extensive coral bank, the extent of

which is not known, stretching about $5\frac{1}{2}$ miles in a north-northeasterly direction from a position about 12 miles northeastward of Pulau Mengalum. The least depth found on this shoal is $4\frac{1}{4}$ fathoms.

Francis Bank, lying about 2 miles north-eastward of the above bank and about 25 miles westward of Ambong Bay (see sec. 10-144), has a least depth of $5\frac{1}{2}$ fathoms, and extends about $4\frac{3}{4}$ miles in a north-north-westerly and opposite direction and about $2\frac{1}{4}$ miles in a northeast and southwest direction, within the 20-fathom curve surrounding this bank.

Bunbury Shoals, about 1 mile northeastward of Francis Bank and about 23 miles westward of Ambong Bay, are about $6\frac{1}{2}$ miles long in a northerly and opposite direction, with a greatest breadth of about $6\frac{1}{2}$ miles, within the 20-fathom curve. The least depth found on these shoals is 4 fathoms.

St. Joseph Rock ($6^{\circ}35' N.$, $116^{\circ}04.5' E.$), about $6\frac{3}{4}$ miles northeastward of the north-eastern extremity of Bunbury Shoals, is located on the southwestern extremity of a coral formation about 2 miles in length, with a least depth of $2\frac{1}{2}$ fathoms. The rock is awash.

A bank surrounds this rock and shoal and extends about 11 miles in a northeast and southwest direction and about $12\frac{1}{2}$ miles in an east and west direction, within the 20-fathom curve, and has a least depth of 5 fathoms near its western extremity. A 6-fathom patch lies about $2\frac{1}{2}$ miles southwestward of the rock. An 8-fathom coral patch lies about $10\frac{1}{3}$ miles southward of the same rock.

Royds Shoal, a small detached patch with a least depth of $6\frac{1}{2}$ fathoms, lies about 15 miles west-northwestward of St. Joseph Rock.

Pritchard Bank, with depths of 12 to 20 fathoms, extends about 3 miles in a north-northeasterly direction from a point about $7\frac{3}{4}$ miles west-northwestward of St. Joseph Rock, and has a breadth of about 1 mile in a northwesterly and opposite direction.

Dolphin Bank, about 1 mile wide with depths of 12 to 20 fathoms, extends about $3\frac{1}{2}$ miles in a north-northwesterly direction from a position about $11\frac{1}{4}$ miles north-northwestward of St. Joseph Rock.

10-167 MANTANINI (MANTANANI) ISLANDS AND OFF-LYING BANKS TO THE

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WESTWARD AND NORTHWARD.—**Mantani-Islands** ($6^{\circ}43' N.$, $116^{\circ}20' E.$), located about 15 miles westward of White Rocks Bay, consist of three coral islands, connected by reefs, lying on a bank with depths of less than 20 fathoms. These islands, which serve as useful landmarks, are uninhabited except during the season for collecting edible birds' nests. Reefs, with less than 3 fathoms over them which dry in places, surround these islands and extend about 1 mile eastward from the easternmost island and about $2\frac{2}{3}$ mile west-northwestward from the westernmost island. There are a number of banks with depths of $6\frac{1}{4}$ to 10 fathoms lying within the 20-fathom curve surrounding the islands.

Pulau Mantanini Besar (Tree Island), the easternmost island of the group, is densely wooded and is low and flat, except near its northwestern extremity, where it rises abruptly to a well defined ridge, 270 feet high.

Pulau Lungisar (Nob Islet), with a rounded summit 205 feet high, lies close westward of Pulau Mantanini Besar.

Pulau Mantanini Kechil, the westernmost island, is long, narrow, and wooded. The trees near the western extremity reach a height of 160 feet.

A **light** is shown from a circular stone tower, 16 feet in height, located on the western extremity of Pulau Mantanini Kechil.

10-168 Anchorage.—There is good anchorage on either side of these islands, depending on the monsoon.

10-169 South Furious Shoals consist of a number of steep-to detached coral formations, with depths of more than 20 fathoms between them, lying from about 4 to 13 miles northwestward of the Mantanini Islands.

The westernmost and largest of these coral formations has a least depth of 7 fathoms and extends $4\frac{1}{2}$ miles in a north-northeasterly direction and $3\frac{3}{4}$ miles in a northwesterly direction from a position about $9\frac{1}{2}$ miles west-northwestward of the western extremity of Pulau Mantanini Kechil. It has a greatest width of about $4\frac{1}{2}$ miles.

The next largest coral formation, with a least depth of 7 fathoms, lies about 7 miles northwestward of the western extremity of Pulau Mantanini Kechil and about $1\frac{1}{4}$ miles eastward of the largest bank.

Three other banks, located eastward of the above formations and from $4\frac{1}{2}$ to 8 miles north-northwestward of the western extremity of Pulau

Mantanini Kechil, have least depths of 8, 8, and 7 fathoms, respectively.

The depths around and between these coral formations are very irregular and shoaler depths than charted may exist.

EMERALD SHOALS, so named because of the bright green color on their northwest side, lie with their east extremity about 15 miles north-northwestward of the west extremity of Pulau Mantanini Kechil and extend in a westerly direction for about 13 1/2 miles. Depths within this extensive shoal, which is about 8 1/2 miles wide, as defined by the 20-fathom curve, range from 4 1/4 to 20 fathoms. Other coral patches, with depths of less than 6 fathoms, exist in the vicinity of the 4 1/4-fathom patch which lies about 17 miles north-northwestward of the west extremity of Pulau Mantanini Kechil. A 5 3/4-fathom patch, with depths of less than 7 fathoms in the vicinity, lies at the west end of Emerald Shoals about 20 1/4 miles northwestward of the same extremity. The other patches found within the limits of these shoals are so numerous and steep-to that it is possible that less water than charted may exist.

Barton Shoal, with a least depth of 6 1/2 fathoms, lying in the center of the shoal, is a coral formation that extends about 4 miles in a northwesterly direction from a position about 7 1/2 miles north-northeastward of the eastern extremity of Pulau Mantanini Besar. It has a width of 2 1/4 miles within the 20-fathom curve surrounding the shoal area.

10-170 NORTH FURIOUS SHOALS, a coral formation, with a least depth of 7 fathoms, is located about 8 miles northward of Barton Shoal and extends about 4 1/2 miles in a northwesterly direction from a position about 24 miles westward of Tanjong Sempang Mangayau (7° 02' N., 116° 44' E.). It has a greatest width of about 2 1/4 miles.

BIG BONANZA SHOAL, a coral formation with a least depth 2 1/2 fathoms, lies about 3 miles northeastward of North Furious Shoals and extends about 8 miles westward from a position about 17 1/2 miles westward of Tanjong Sempang Mangayau. It has a greatest width of about 3 miles, within the 20-fathom curve surrounding the shoal area.

A depth of 11 fathoms was charted (1962) about 2 3/4 miles northward of Big Bonanza Shoal in position 7° 09' 36" N., 116° 25' 24" E.

HARRINGTON SHOAL, a small coral formation, with a least depth of 7 1/2 fathoms, lies between Big Bonanza Shoal and the coast

and is located about 14 1/4 miles westward of Tanjong Sempang Mangayau. It is circular in shape and has a diameter of about 1 1/3 miles within the 20-fathom curve.

10-171 NORTH COAST OF BORNEO.—TANJONG SEMPANG MANGAYAU TO TANJONG NARUNTONG INCLUDING MARUDU BAY AND KUDAT HARBOR.—TANJONG SEMPANG MANGAYAU (7° 02.4' N., 116° 44.3' E.), the northwestern extremity of Borneo and the northwestern point of Marudu Bay, is readily distinguished by its grassy bluff, and by Pulau Kalampunian which lies about 1 mile northward of it, within the 10-fathom curve fronting it.

PULAU KALAMPUNIAN is a small island of sandstone formation which rises abruptly from a flat composed of detached reefs to a height of 37 feet. A reef, which dries about 6 feet, extends about 1/2 mile southeastward from the island. In 1956 there was a patch of sand, awash at high water, on the highest part of this reef. A 4 1/4-fathom coral patch lies about 1/2 mile northwestward of the island.

There is a safe channel about 1/2 mile wide between the island and Tanjong Sempang Mangayau. This channel has a least depth of 6 1/2 fathoms in the fairway and the reefs on either side of it are visible.

LIGHTS.—A light is shown on Pulau Kalampunian.

10-172 MARUDU BAY, into the head of which the Sungai Marudu flows, is entered between Tanjong Sempang Mangayau, and Cape Mafsie, 18 miles east-southeastward. This bay is about 25 miles in length in a southerly direction and has general depths of 6 to 18 fathoms, decreasing gradually toward the head of the bay. Several rivers which shift their channel after each rainy season flow into this bay.

ASPECT.—Low hills rise from the northwestern shore to an elevation of over 600 feet. Melau Besar, 680 feet high, has a flat and bare summit and lies about 1 1/4 miles westward of Pirate Point, located about 17 miles south-southeastward of Tanjong Sempang Mangayau. Matungun, a thickly wooded peak, 1,284 feet high, lies about 5 miles southwestward of Melau Besar.

From the southeastern shore the hills rise to an elevation of over 2,000 feet and are all thickly wooded.

10-173 NORTHWESTERN SHORE OF MARUDU BAY.—Between Tanjong Sempang Mangayau and Tanjong Tajau, 6 3/4 miles south-eastward, the coast is bordered by rocks and shoal water, which extend 1/2 mile offshore in places.

From Tanjong Tajau to Tanjong Kapor, 60 feet high, about 4 2/3 miles south-southeastward, the coast is foul for a distance of about 1/2 mile offshore. In this stretch lie Tanjong Agong Agong and Agong Agong River about 1 1/2 and 1 3/4 miles, respectively, south-southeastward of Tanjong Tajau. Targett Rock, 30 feet high and marked by a concrete block, is the highest point on the extremity of Tanjong Kapor. Two 20 foot patches lie about 800 yards east-southeast and 1,800 yards southeast of Tanjong Agong Agong.

Between Tanjong Kapor and Tanjong Bornugus, the northern entrance point of Kudat Harbor, 1 mile south-southwestward, a reef of sand and coral, which dries in patches, extends about 3/5 mile offshore. Coral shoals, with depths of 2 and 3 fathoms, lie outside this reef almost 1 mile eastward of Tanjong Bornugus.

10-174 KUDAT HARBOR AND APPROACH.—Kudat Harbor is 1 1/2 miles wide between Tanjong Bornugus and Tanjong Tigasamil, which lies to the south-southeastward. The entrance is about 2/3 mile wide between the 6-fathom curves fronting the above points. The entrance depths are 6 to 9 fathoms, and about 1 mile within a line joining the entrance points, the water shoals gradually from the 3-fathom curve to the shallow water at the head of the bay.

On the northern side of the harbor there is a bay with shallow water, entered between the point located about 1/2 mile westward of Tanjong Bornugus and Egeria Bluff, about 1 1/4 miles farther westward. The Bum Bun River, which has a depth of 1 1/2 feet on the bar, and from 2 to 4 fathoms within, for a distance of about 1 1/2 miles, flows into the northwestern corner of the bay. Telegraph wires cross the river mouth overhead and are very low. About 1 mile westward of Egeria Bluff, the land rises to a height of 411 feet.

About 2 1/2 miles inside the harbor entrance there are three shallow bays encumbered with shoals. The sungei Tigarangen

flows into the southernmost bay, and has depths of 1 1/2 feet in the entrance, and from 2 to 5 fathoms within for a distance of 1 1/4 miles.

White Rock, 27 feet high, lies on the edge of the reef extending from the southern shore, about 2 1/4 miles westward of Tanjong Tigasamil. Between White Rock and Tanjong Tigasamil, the southern shore is fringed by a reef extending 1/4 mile offshore in places. The hills on the southern side of the harbor attain a height of almost 460 feet.

LANDMARKS.—Conspicuous objects which mark the approach to Kudat Harbor are the Government pier, the radio tower at Kudat, Gueritz Rock Beacon and Sandilands Rock Light.

10-175 DANGERS—LIGHTS—BEACONS.—Sandilands Rock, with a depth of 7 1/2 feet, lies in the middle of the entrance to Kudat Harbor, almost 1 mile southeastward of Tanjong Bornugus.

A light is shown from a structure at the west end of Sandilands Rock.

A light is shown near the root of the pier in a position about 385 yards southwest by west of Tanjong Bornugus.

Witti Rocks are two rocks, with depths of less than 6 feet over them lying close to the northward of Sandilands Rock, and about 5/6 mile east-southeastward of Tanjong Bornugus. Close northward of each rock there is a 3-fathom patch.

Tigasamil Spit, which dries, extends about 800 yards northeastward from Tanjong Tigasamil, and has depths of 1/2 fathom to 2 1/2 fathoms extending about 300 yards farther in the same direction. A red and white beacon with a cone topmark, point down, stands on the outer end of this spit about 900 yards northeastward of Tanjong Tigasamil. An islet, 20 feet high, lies close off Tanjong Tigasamil on this spit. A reef, which dries, and on which is Tern Rock, 4 feet high, extends 1/4 mile northward of the northern part of Tanjong Tigasamil.

Gueritz Rock, with a depth of 2 feet, lies about 700 yards southward of Tanjong Bornugus and marks the southern extremity of the reef which extends offshore between Tanjong Kapor and Tanjong Bornugus. It is marked by a light.

Datum Rock, covered only at the highest spring tides, dries 7 feet, and lies on the edge of the bank fringing the north shore about 800 yards westward of Tanjong Bornugus. A small white beacon, surmounted by a triangle is located on Datum Rock.

A rock, with a least depth of 6 feet over it, exists in the middle of Kudat Harbor about 3/4 mile west-southwest of Datum Rock.

10-176 Tides.—Tidal heights above datum of soundings are: M.H.H.W. 5.9 feet; M.L.H.W. 4.1 feet; M.H.L.W. 4.0 feet; M.L.L.W. 1.8 feet.

10-177 Tidal currents.—The tidal currents are weak, the maximum observed during a stay of 3 months being 1/2 knot.

10-178 Anchorage.—The best anchorage is in about 6 1/2 fathoms, soft mud, about 2/3 mile southward of Tanjong Bornugus, with the Government flagstaff near Tanjong Bornugus, bearing 354°, distance 3/5 mile and Sandilands Rock Light bearing 085°. Another sheltered anchorage is in 4 1/2 fathoms 600 yards west-southwestward of Tanjong Bornugus.

Anchorage is prohibited within 2/3 mile of the light near the root of the Government pier, and also in the approach fairway to the wharf for vessels having explosives or dangerous petroleum on board.

Anchorage is prohibited within 600 yards of the light structure on the pier at Kudat.

Weather.—From April to October is the driest time of the year at Kudat, at which time fever is most prevalent. For the rest of the year, particularly during December and January, there are strong northeast winds with heavy rains.

Signals.—The following berthing signals shown from Government flagstaff, of the International Code of Signals are used:

Signal	Meaning
AVG	Come alongside
DB	Anchor
DC	Anchor as convenient

The following tide current signals, for tidal current alongside the Government Pier, are shown from the Government flagstaff:

Signal	Meaning
Cone, point down	Flood
Cone, point up	Ebb
Ball	Slack

10-179 Directions.—After passing Pulau Kalampunian, the coast should not be approached within 2 miles, and when abreast of Tanjong Tajau, Melau Besar will be seen southward of Kudat Harbor. This hill, kept open eastward of the islet off Tanjong Tigasamil, bearing 199°, will lead eastward of the reef extending from Tanjong Kapor and eastward of Sandilands Rock. When Johnstone Bluff, on the northern shore near the head of Kudat Harbor bears 275°, it may be steered for, passing between Sandilands Rock and Tigasamil Spit, and thence to the anchorage.

10-180 KUDAT (6° 53' N., 116° 51' E.).—Kudat is a settlement located on the north point of the entrance of the harbor. The port owes its importance to its being the distributing center of the various copra and rubber estates in the vicinity.

The population of the settlement was 3,850 (1960) and the population of the District of Kudat was about 35,00 (1956).

Pier.—A dog-legged reinforced concrete pier about 300 feet long, can accommodate 2 vessels of about 375 feet in length. The depth alongside is 22 feet. There are no cranes at this port. One 250-ton self-propelled lighter is available.

Supplies.—Fresh provisions may be obtained in plentiful quantities. Boiler water is laid onto the pier. A limited supply of diesel oil is obtainable.

Communications.—There is regular communication by steamer with Singapore and other ports of North Borneo. The settlement has a post office and is connected to the North Borneo telegraph system. Air service operates between Kudat, Jesselton and Sandakan.

Hospital.—There is a native hospital located at the settlement.

Meteorological table.—See Appendix II.

10-181 WESTERN SIDE OF MARUDU

BAY—TANJONG TIGASAMIL TO WOODY ISLAND.—Between Tanjong Tigasamil and Pulau Melau, about 1 3/4 miles south-south-eastward, a bay indents the coast. There are depths of 8 to 10 fathoms in the bay and it is clear of dangers outside a distance of about 1 mile from the shore; within that distance the shores of the bay are fronted by reefs and detached rocks.

Pulau Melau, an island about 65 feet high, is triangular in shape, about 1/3 mile in extent, and is connected with the shore at low water. A reef, that dries, extends about 1/2 mile east-southeastward and southward, the eastern part of which is surrounded by shoal water to a distance of 300 yards. The southern side of this reef is steep-to. A 1 3/4 fathom patch lies about 1/3 mile northeastward of Pulau Melau and is marked on its northeastern side by a BEACON.

Pirate Point, 3 miles southward of Pulau Melau, is a low sandy point fringed with mangroves. A sandy spit extends about 1/2 mile eastward from this point and about 1/2 mile northward to the mouth of a small river. Southwestward of the point the coast is fringed with mangroves, and small streams flow out at intervals; reefs, sand and mud flats extend about 800 yards offshore in places.

BARRAUT REEF, a rocky shoal with a least depth of 4 feet, lies on a coral patch near the middle of Marudu Bay, about 4 1/4 miles southeastward of Pirate Point. A beacon, painted in red and white bands and surmounted by a spherical topmark, stands on the south end of the reef. A 3/4-fathom patch lies about 1 1/4 miles north-northeastward of the beacon.

Brandon Reefs, consisting of several large coral patches which nearly dry, lie from 4 1/2 to 5 1/2 miles south-southwestward of Pirate Point, within the 6-fathom curve fronting the shore.

Woody Island, about 18 feet high, lies about 8 1/2 miles south-southwestward of Pirate Point. The island is a small mound surrounded by low rocks studded with mangroves and is connected to the Sungei Matung-gong by a sandbank which dries 2 feet.

From abreast of Woody Island, the shore is fringed with mangroves and intersected by small streams as far as the entrance of the Marudu River lying about 4 1/2 miles southward. Extensive sand and mud flats, the latter of which dry from 1 foot to 5 feet, lie up to about 3 1/2 miles from the shore.

The **CHANNEL** leading to the entrance of Marudu River has a least depth of 1 1/2 feet and follows a general west-southwesterly direction for about 3 miles between extensive mudbanks. BEACONS mark the channel leading to the river entrance but their positions are constantly changed as the channel alters.

Small boats of about 6 feet draft can ascend this river for about 1 1/2 miles at high water, but the channel must be previously marked by beacons.

Between the entrance of Marudu River and that of Sungei Taritipan, 5 miles eastward, the coast is covered with dense mangroves. Mud banks, which dry from 1 foot to 2 feet, front the shore.

Between Sungei Taritipan and Tanjong Batu, about 2 miles northward, the coast is densely wooded and hills over 1,000 feet high lie close to the coast. A small and shallow bay lies between Tanjong Batu and the point 3/4 mile southward; the mud at the head of which dries for a distance of about 300 yards from the shore.

10-182 ANCHORAGE IN HEAD OF MARUDU BAY.—Vessels with a draft of 20 feet, may anchor in 5 1/4 fathoms with Tanjong Batu bearing 060°, distant about 3/4 mile and those of less draft with Tanjong Batu, bearing 035°, distant about 3/4 mile, in about 4 fathoms, mud.

Vessels with a draft of 15 feet may anchor in about 3 1/2 fathoms, mud, off the entrance of the Marudu River, with the south extremity of Tanjong Batu bearing 104°, distant about 2 1/2 miles. Deeper draft vessels, should anchor about 600 yards northeastward of this anchorage, in 5 1/2 to 6 fathoms, with the south extremity of Tanjong Batu, bearing 109°, distant about 2 1/3 miles.

10-183 EASTERN SIDE OF MARUDU BAY—CAPE MAFSIE TO TANJONG BATU.—Cape Mafsie (6° 56' N., 117° 02' E.), the eastern entrance point of Marudu Bay, is 50 feet high with conspicuous white cliffs, and has a sharp rock, 35 feet high, with another rock, 30 feet high, lying close northeastward of it. The cape is fringed by a reef that extends about 1/2 mile westward, 1 1/2 miles northwestward and 2 miles northward from it. The east side of this reef forms the west side of the inlet leading to the Sungei Melobong. A detached reef, the south part of which dries, lies about 1/4 mile off the northwest extremity of this reef, and foul ground extends

almost 1 mile northward from the fringing reef.

A shoal, with a least depth of 6 feet, lies about 3 1/2 miles northwestward of Cape Mafsie.

A rocky shoal, the center of which dries, lies about 1/4 mile from the western edge of the fringing shoal, and about 2 miles northwestward of Cape Mafsie.

A detached rock, with a least depth of 6 feet, lies about 2 miles west-northwestward of the cape.

Tanjong Perawan, which is 56 feet high, and identified by its red cliffs, lies about 2 1/2 miles southward of Cape Mafsie. Between this point and the entrance of the Sungei Bengkoka, about 3 miles southward, the coast forms a bay which is (continued on page 255)

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fronted by a sandbank that dries for a distance of $1/4$ to $3/4$ mile from the shore. A flat, with depths of less than 3 fathoms, extends about $2 1/4$ miles offshore. Casuarina trees extend along this part of the coast.

10-184 The entrance of the Sungei Bengkoka, which is the largest river flowing into Marudu Bay, is about 800 yards wide, but decreases to a uniform width inside of about 200 yards. A sandspit extends about $1 3/4$ miles westward from the northern entrance point, Bengkoka Islet, 25 feet high to the treetops, lies on the southern edge of this spit about 1 mile west-southwestward of the point. About $1 1/2$ miles eastward of this islet the river turns sharply southward and a branch, called the Sungei Telaga, runs to the southeastward. Telaga village stands on the northeastern shore of this river about 2 miles eastward of Bengkoka Islet.

The channel leading to the entrance of the Sungei Bengkoka is marked by beacons, the positions of which are constantly changed as the channel alters. The depth on the outer bar is about 3 feet in the channel, within which the depths increase. Boats of about 8 feet draft can ascend the river at high water to the village of Pitas, a distance of about 12 miles.

The coast between the mouth of the Sungei Bengkoka and the point about 7 miles southwestward of Bengkoka Islet, is sandy and bordered with high casuarina trees and is fringed by sandbanks and shoal water, which extend from $3/4$ to $1 1/4$ miles offshore, within the 3-fathom curve.

The Sungei Tengah, a branch of the Sungei Bengkoka, flows into Marudu Bay between two sandspits, which lie about $1 1/2$ miles south-southwestward of Bengkoka Islet and extend about $3/4$ mile offshore. The depth on the bar between these spits is 1 foot.

The Sungei Taka flows out into the bay about $3 1/4$ miles southwestward of the mouth of the Sungei Tengah. The western side of the entrance channel is formed by a sandpit which projects northward for more than 1 mile from the western entrance point. Depths of less than 2 feet are found on the bar lying to the northward of the sandspit.

Zebra Reefs are several coral patches, with deep water between them, lying within the 10-fathom curve fronting the shore and about 2 miles southwestward of the mouth of the Sungei Taka.

Between the shore abreast of Zebra Reefs, and a point $2 3/4$ miles southward, the coast forms a bight fringed with mangroves and intersected by small streams. The hills inland slope gradually to the shore. A bank of coral and sand extends $1/2$ mile offshore in places.

10-185 MEMPAKAD VILLAGE ($6^{\circ} 41.4' N.$, $116^{\circ} 57.7' E.$) is located about 10 miles south-southwestward of Bengkoka Islet. Powell Rock, with a least depth of 6 feet, lies about $1/4$ mile offshore and about $3/4$ mile northward of Mempakad. Southeastward of the rock, a reef, that dries, extends about 550 yards from the shore. Good anchorage for small vessels in a depth of 7 fathoms, mud, is found about $1/2$ mile northwestward of the village.

From Mempakad village to Ridge Point lying about $3 1/2$ miles southwestward, the coast is fringed with a reef of sand and coral. This reef extends about 1 mile north-northeastward from Ridge Point.

From Ridge Point to Tanjong Batu lying about 4 miles southwestward, the coast is fringed with coral reefs and foul ground to a distance of about $1/2$ mile from the shore. Casuarina trees are found along this stretch of the coast and hills with heights up to 870 feet lie within one mile of the coast. The Mari Sim Sim River flows out on the western side of Tanjong Batu.

10-186 NORTHERN COAST OF BORNEO—Cape Mafsie to Tanjong Naruntong.—From Cape Mafsie, the coast trends north-northeastward $1 1/4$ miles to the western entrance of an inlet leading to the Sungei Melobong. The coast is fronted by a reef that extends about 2 miles to the northward and forms the west side of the inlet. Both entrance points are fringed by reefs which reduce the width of the channel to about $2/3$ mile. Posts, with striped tops, mark the edge of the reef on the northeast side of the inlet. The head of the inlet is much encumbered by mudbanks, which leave a narrow channel towards the northeast shore with depths of 9 to 18 feet in it in 1955. The channel is difficult to find where it passes through the mud banks at the head of the inlet.

Pulau Sapirak, thickly wooded, lies on the edge of the coastal reef about $1/4$ mile northwestward of the northeast point of the inlet. The perimeter of the island is sur-

mounted by steep cliffs about 50 feet high and rises to an elevation of 110 feet to the tops of the coconut trees which stand on it.

Boats approaching the inlet should steer for Pulau Sapirak on a course of 103° , and when within a distance of 1 mile from it, a southerly course leads to the entrance of the channel extending to the mouth of the river.

From the coast abreast of Pulau Sapirak, the coast trends in a general east-northeasterly direction for about 6 miles to Tanjong Naruntong, the northern extremity of Borneo.

10-187 Dangers.—Owing to the risk of uncharted dangers, vessels should not enter within the areas known as the Northwest Borneo Dangers and the North Borneo Dangers. These areas are enclosed by the following limits: A line drawn in a 305° direction for 4 miles from Cape Mafsie; thence in a 021° direction for about $4\frac{2}{3}$ miles; thence in a 085° direction for about 10 miles, and thence in a 200° direction to Tanjong Naruntong.

10-188 Remarks.—The area northward of this danger area, is fully described in H.O. Pub. No. 92, Philippine Islands, Vol. III.

NORTHEAST COAST OF BORNEO—TANJONG NARUNTONG TO SANDAKAN HARBOR,
INCLUDING MALLAWALLE CHANNEL

11-1 GENERAL REMARKS.—The area northward of Borneo including Banguay West Channel, Banguay South Channel and Balabac Straits are not described in this book. A complete description of this area will be found in H.O. Pub. 92, Philippine Islands, Vol. III.

Coast.—From Tanjong Naruntong the coast trends in a southeasterly direction for a distance of 7 1/2 miles to Tanjong Layang Layang. The coast is low and a reef fringes the shore up to a distance of 1 1/4 miles. The coast is densely wooded from a point about 4 1/2 miles southeastward of Tanjong Naruntong to Tanjong Layang Layang.

11-2 MALLAWALLE (MALAWALI) CHANNEL lies between the northeast coast of Borneo and Mallawalle Island, about 6 miles northeastward. Dangers extend about 3 1/2 miles from the northeastern coast of Borneo, and about 1/2 mile from the southern end of Mallawalle (Malawali) Island. Between these shoals lies the main channel which is about 1 mile wide between the 10-fathom curves fronting the coast and the island.

11-3 SOUTHERN SIDE OF MALLAWALLE CHANNEL.—On the southwestern side of Mallawalle Channel between Tanjong Naruntong and Tanjong Layang Layang about 7 1/2 miles southeastward, the shore is fringed by a bank on which there are numerous reefs and rocks, sunken and awash, extending about 3 1/4 miles offshore.

Silk Island (Pulau Lakataan), 3 1/2 miles southeastward of Tanjong Naruntong and almost 1/2 mile offshore, has a conspicuous red cliff, 36 feet high, on its northeast side. It is surrounded by a reef which extends 3/4 mile from its eastern side in an easterly direction.

About 1 mile northeastward of Silk Island is a cay surrounded by a reef which extends about 1 mile northward and 1/2 mile southward, eastward, and westward from it.

Several sunken dangers lie about 2 miles northward of Silk Island within the 6-fathom curve fronting the shore and a 3-fathom coral patch lies outside the 6-fathom curve about 2 1/3 miles northward of Silk Island. A sunken rock lies about 3 1/4 miles northwestward of Silk Island, within the 6-fathom curve fronting the shore.

Pulau Nangka (Lingasan) is a rocky reef, 37 feet high, about 3 1/2 miles eastward of Silk Island and about 1 2/3 miles north-northeastward of Tanjong Layang Layang.

Passage Reef, awash and easily distinguished, lies about 1 1/2 miles northeastward of Pulau Nangka. A light is shown on the northeastern side of Passage Reef, which may be passed on either side, but the channel northeastward of it is recommended.

Fly Rock, a coral head that dries 1 foot, lies 1 3/4 miles southeastward of Passage Reef and about 2 miles eastward of Pulau Nangka. About 1/2 mile southward of Fly Rock is a coral reef, parts of which dry. Foul ground extends westward from this reef to the reefs and foul ground fronting the coast.

11-4 NORTHERN SIDE OF MALLAWALLE CHANNEL.—Egeria Rocks, with a depth of 2 feet and steep-to, lie in the middle of the northwestern end of the channel about 2 1/2 miles westward of West Island (Pulau Mati), which lies close off the western side of Mallawalle Island. Shoals with depths of 5 3/4, 6, and 6 1/2 fathoms lie about 3/4 mile southwestward of Egeria Rocks and about 3 1/2, 3, and 2 3/4 miles, respectively, westward of the western extremity of West Island.

A beacon, painted red and white and having a can topmark, marks a dangerous rock 1 1/2 miles westward of Egeria Rocks. Vessels should keep to the southwestward of the beacon as there is dangerous ground between it and Egeria Rocks. A 3 1/4-fathom

patch also lies about 2 1/4 miles west-southwestward of West Island necessitating further caution in the area.

Reefs fringe the southern shores of Mallawalle Island to a distance of about 1/2 mile and mark the northern side of the channel.

A reef, awash, on which there is a small sand cay, lies about 2 3/4 miles eastward of Passage Reef and marks the northeastern side of the channel. It is marked by a beacon painted red and white.

A group of small reefs, the northeastern one of which dries 1 foot, lie about 3 3/4 miles east-southeastward of the southern extremity of Mallawalle Island. Three rocks, having less than 6 feet over them, lie between 2 2/3 and 3 1/4 miles eastward of the south extremity of Mallawalle Island.

A rock, with a depth of less than 6 feet, lies about 300 yards westward of the southwest end of the above group of small reefs and about 3 1/2 miles east-southeastward of the south extremity of the island.

11-5 TIDAL CURRENTS.—In the Mallawalle Channel the flood runs to the eastward and the ebb to the westward with a velocity of about 2 1/2 knots at springs.

11-6 DIRECTIONS.—The trees of Kukuban (sec. 11-9) in range about 118° with the northeast tangent of Tigabu, leads northeastward of Passage Reef and between Fly Rock and the reef with a small sand cay on it to the northeastward.

11-7 MALLAWALLE EASTERN DANGERS comprise a large number of detached reefs and shoals which extend 10 or 11 miles in an easterly and southeasterly direction from Mallawalle Island. Passage through these reefs should not be attempted.

11-8 COAST.—The northeast coast of Borneo, between Tanjong Layang Layang and the northern entrance point of Sandakan Harbor, about 85 miles southeastward, is generally low, densely wooded, and intersected by numerous rivers and streams. The coast, part of which has not been completely surveyed, is fronted by numerous coral reefs and dangers. Bankoka Hill, a conspicuous wooded hill, 587 feet high, lies about 9 1/2 miles south-southeastward of Tanjong Naruntong, and 1 1/4 miles from the coast.

11-9 OFF-LYING ISLANDS AND DANGERS—PULAU MANDIDARAH TO TIGABU ISLAND.—Dangers lie on each side of the recommended track shown on H. O. Chart 2796 and mark the recommended passage between Mallawalle Channel and Sandakan Harbor. Directions for this passage are given in sec. 11-39.

The vast danger areas lying well to the northeastward of the recommended track have not been completely surveyed and are not described in this book. Information regarding these dangers will be found in H. O. Pub. 92, Philippine Islands, Vol. III.

PULAU (MANDIRALLA) MANDIDARAH, a palm covered island, about 85 feet high to the tree tops, lies on the southwest side of the recommended track about 8 miles east-southeastward of Silk Island. It is surrounded by a coral reef that extends about 2/3 mile from its north side and 1 mile northeastward and eastward from its east side. Foul ground extends about 3 1/2 miles southeastward and 4 1/2 miles south-southeastward from it. The area between the island and the coast lying to the southwestward is foul and has not been completely surveyed.

Kukuban, a sand cay, lies on the western edge of a coral reef located close to the east side of the recommended track, about 4 miles eastward of Pulau Mandidarah and about 1 1/2 miles east-northeastward of the foul ground lying to the southeastward of Pulau Mandidarah. The cay is covered with trees about 85 feet high. A light is shown from Kukuban.

About 1 1/4 miles south-southeastward of Kukuban is a rock, which dries and marked by a red and white **BEACON, SKY ROCK**, awash and lying about 2 miles south-southeastward of Kukuban, is marked by a light. A 1-fathom patch lies about 600 yards eastward, and a 3-foot patch lies about 1/2 mile farther eastward of the latter rock and about 2 miles south-southeastward of Kukuban.

Merlin Rock, nearly awash, with a depth of 6 feet over it, and dark colored, lies about 1 1/2 miles southeastward of Kukuban. A sand cay on a coral reef, and a coral patch lie 1 3/4 miles east-southeastward and 2 1/4 miles southeastward, respectively, of Kukuban.

Pulau Tibakan, a sand cay covered with trees about 10 feet high, lies about 3 1/2 miles eastward of Kukuban. The island is surrounded by a reef that extends about 3/4 mile to the eastward. Dangers lie about 3/4 mile eastward and east-northeastward of the island, and about 1 1/4 miles northeastward of the island. A coral reef 3/4 mile long in a northwesterly and opposite direction, lies about 1 1/2 miles northwestward of Pulau Tibakan. Two small coral reefs lie close to the westward of this reef.

In 1934, a vessel with a draft of 13 1/2 feet reported striking an obstruction about 3/4 mile southwestward of Pulau Tibakan.

Pulau Tambulian, about 70 feet high to the tree tops and surrounded by a reef, lies 2 1/4 miles northward of Pulau Tibakan.

Pulau Buaning, a sand cay, is located on the southern edge of a reef, that lies about 1 1/2 miles eastward of Pulau Tambulian and extends about 1 1/2 miles eastward from that point.

Mosquito Rock, with a depth of 3 feet, is located about 2 1/4 miles northeastward of Pulau Tibakan and lies between it and Pulau Buaning.

The danger area to the northward and northwestward of Pulau Tambulian, known as Mallawalle Eastern Dangers, has been previously described. (See sec. 11-7.)

TIGABU (6° 53' N., 117° 28' E.), about 2 1/2 miles southward of Pulau Tibakan, is an oval shaped island about 1 mile in extent. It is about 227 feet high to the tree tops. A steel framework tower, 40 feet high, stands on the summit of the island. A reef surrounds the island to a greatest distance of about 3/4 mile on its northwest side. Detached reefs, on which there are several sand cays, extend about 3 1/3 miles east-northeastward and 2 1/2 miles northeastward from the northeast extremity of the island.

11-10 COAST.—From Tanjong Layang the coast trends in a southerly direction for a distance of about 5 miles to a point eastward of Bankoka Hill and is low and densely wooded. Between this point and Tanjong Kinulubaltan (Semangut), 22 miles south-eastward, the coast has not been surveyed. About 2 1/2 miles northward of Tanjong Kinulubaltan is Tanjong Papahanan, the south-

eastern extremity of Pulau Jambongan, and between the northwestern side of this island, about 8 1/2 miles northwestward, and the coast of Borneo westward of it is Paitan Bay, which has been only partially examined and is encumbered with numerous islets and reefs and is apparently shallow.

Bush Island lies in the foul ground, about 7 1/2 miles west-northwestward of the northern extremity of Pulau Jambongan. It is a sandy cay, on which there are a few bushes about 20 feet high, lying near the middle of a coral reef.

About midway between Bush Island and the point eastward of Bankoka Hill is Tanj Bungaan, a densely wooded islet. There is much foul ground between Pulau Mandidarah, the coast of Bankoka, Tanj Bungaan, and Bush Island.

PULAU JAMBONGON, lying 13 miles southeastward of Bankoka Hill, is 11 miles in length east and west and about 7 1/2 miles in breadth, north and south. The island is separated from the mainland to the southward by a channel, which has not been completely examined, with a least width of about 3/4 mile. Northwest Bluff, 510 feet high, the northwestern extremity of the island, and Southwest Bluff, about 460 feet high lying 5 miles southwestward, are prominent headlands on the western side of the island. An inlet lies between these bluffs and penetrates the island in an east-southeasterly direction for over 3 miles. The entrance to the inlet has a least depth of 2 fathoms and is about 1 1/2 miles wide. The land at the head of the inlet, which is not defined, is low and densely wooded. The shores of the inlet and of the southern and eastern sides of the island are wooded. The northern point of the island rises to a hill about 3/4 mile within the point. The village of Jambongan is located on the southeastern side of the island midway between two cliffs about 2 miles apart. The eastern cliff, 20 feet high, lies about 1 mile southwestward of Tanjong Papahanan and the western cliff, 20 feet high and red, lies about 2 miles farther in the same direction.

11-11 DANGERS.—The western shores of Pulau Jambongan appear to be clear but the water is shallow. A sand patch and reef, which dry 4 feet, lie a little less than 2 1/2 miles west-southwest of Northwest Bluff.

From the northeastern coast of Pulau Jambongan reefs and dangers extend northward and northeastward to a distance of about 5 1/2 miles and eastward for 8 miles. On these reefs are many sand cays, two of which, Mabahok and Kalangaan, are especially conspicuous. Mabahok, 70 feet high and covered with trees, lies about 1 3/4 miles north-northeast of the northern extremity of the island; Kalangaan, 10 feet high and covered with bushes, lies about 2 1/4 miles north-eastward of the same point.

11-12 ANCHORAGE.—The approach to the anchorage, from the recommended track between Mallawalle Channel and Sandakan, shown on the chart, is by a clear passage about 3 miles wide between the foul ground southeastward of Pulau Mandidarah and Bush Island on the west and the dangers extending about 5 1/2 miles northward of Pulau Jambongan on the east. The depths decrease gradually from 11 and 12 fathoms in the outside channel to 5 fathoms, at the anchorage, a distance of about 7 miles. Vessels may anchor in 5 fathoms, mud, to the northward of Pulau Jambongan, with the west extremity of Northwest Bluff bearing 180°, and Tanjong Landung Hayang, the north extremity of the island bearing 105°. Small vessels can anchor closer inshore with safety.

11-13 DIRECTIONS.—Vessels approaching from the northwestward on the recommended track, should pass southwestward of Kukuban Cay, and when it bears 000° steer 180°, keeping it astern until the southeast extremity of Tigabu Island bears 076°, when a course of 195° will lead to the anchorage.

Vessels approaching from the eastward on the recommended track, should pass southward of Tigabu Island, and when the southeastern extremity of that island bears 076° steer 256°, keeping it astern until Kukuban Cay bears 000°, when a course of 195° will lead to the anchorage.

Directions for the passage between Mallawalle Channel and Sandakan are given in sec. 11-39.

11-14 OFF-LYING ISLANDS AND DANGERS INCLUDING MARCHESA BAY—PULAU SIPINDUNG TO KESTREL SHOALS.—The off-lying islands and reefs, between which a vessel must pass on her way from Mallawalle Channel, have been surveyed to a dis-

tance of 13 to 20 miles from the coast; beyond this there is a vast unexplored area.

PULAU SIPINDUNG, a sand cay about 15 feet high, which covers at high water, lies about 4 1/2 miles east-southeastward of Tigabu Island on the western side of a reef which extends about 1/2 mile southeastward from it. **SHOALS**, with depths of 2 and 3 fathoms, lie about 1/2 mile southward and southwestward from the cay. It was reported, in 1936, that the shoal located about 1/2 mile southward of the cay was extending southwestward and that there was less depth over it than charted. Dangers extend about 1 1/4 miles northwestward and northward and about 2 1/2 miles north-northeastward from the cay. Between these dangers and those lying east-northeastward of Tigabu there is a passage, clear of dangers, 1 1/2 miles in width.

About 1 1/2 miles southwestward of Pulau Sipindung, there is a group of reefs, the northeasternmost, Gibson Reef, being marked by a lighted beacon. Two 2 3/4-fathom patches lie about 3/4 mile southeastward and south-southeastward of the beacon, and a 3 1/2-fathom patch lies about 1 mile west-southwestward of it. A 2 3/4-fathom patch lies about 3/4 mile farther west-southwestward. A **SHOAL**, with a depth of less than 6 feet, lies about 1 mile southwestward of the beacon.

A **CHANNEL** about 2/3 mile wide and clear of all dangers, through which the recommended track from Mallawalle Channel passes, lies between these dangers and those lying about 1/2 mile southwestward and southward of Pulau Sipindung.

Two shoals, with a least depth of 2 1/2 and 4 3/4 fathoms, lie 1 1/2 and 1 3/4 miles respectively, west of Sipindung. A **LIGHT BEACON** marks the 2 1/2-fathom shoal.

Harrison Reef lies on the northeast side of the track, about 1 3/4 miles southeast of Pulau Sipindung. A beacon, painted red and white, marks the south side of the coral reef.

Sandy Island, a small sand cay 5 feet high, lies near the middle of a coral reef, 4 1/2 miles southeastward of Pulau Sipindung. A framework tripod beacon, 35 feet high, stands on the westward edge of the reef.

A 4-fathom coral patch lies 3/4 mile south southeastward of Sandy Island beacon, and for a distance of about 3 miles north-eastward of this 4-fathom patch, there are

numerous shoals with depths of from 4 to 10 fathoms. The positions of these shoals can best be seen on the chart. Patches with depths of 11 feet and 41 feet lie, respectively, about 1/2 mile and 1 mile southwestward of Sandy Island Beacon. A patch with a depth of 9 feet lies about 3/4 mile west of the beacon, with foul ground between. A beacon stands on the southwest edge of the patch.

John Rock, with a depth of 25 feet; lies about 1 3/4 miles southwestward of Sandy Island Beacon, with a 33-foot patch about 1/2 mile southward of it. The recommended track passes between the 11-foot patch and John Rock, with care being taken to avoid the 41-foot patch.

LEONAN, a small sand cay which dries 3 feet, lies about 5 miles southward of Sandy Island. A REEF extends about 1 mile northeastward from the cay and marks the southwest side of the recommended track. Numerous shoal patches with depths of 3 feet to 4 3/4 fathoms, lie from 2 to 3 miles west-northwestward to north-northwestward of Leonan. An extensive CHAIN OF REEFS on which there are 4 small cays extends about 7 miles southwestward from Leonan Cay to Pulau Jambongan.

POLE REEF, a small drying reef, marking the northeast side of the recommended track, lies about 2 3/4 mile east-northeastward of Leonan Cay and about 4 1/2 miles southeastward of Sandy Island. A LIGHTED BEACON is shown on the western side of this reef. Between this reef and that on which Leonan lies there is a channel clear of dangers, about 2 miles in width. Reefs and foul ground lie from 3/4 mile to 1 3/4 miles northeastward of this reef.

A red and white BEACON marks a 1 1/4-fathom patch about 4 3/4 miles south-southwestward of Pole Reef.

11-15 BILLEAN NORTH DANGERS are a group of coral reefs, with a least known depth of 3 feet, lying 4 1/2 miles eastward of the beacon mentioned in the preceding paragraph. These dangers, which have not been com-

pletely examined, lie about 1 1/2 miles north-northeastward of the recommended track and should be carefully avoided.

SEDGEMAN ROCK, with a least depth of 4 1/2 fathoms, coral, lies about 1 1/4 miles southwestward of the recommended track and about 7 1/2 miles east-southeastward of Leonan Cay.

BILLEAN, an island or cay 38 feet high, on which are a few bushes, lies about 12 miles southeastward of Leonan Cay, in a position about 9 1/2 miles from the coast. A cay lies about 1/4 mile southeastward of it. Billean Island is surrounded by coral reefs and dangers that extend about 3 3/4 miles northeastward from it.

A lighted can BUOY, painted in black and yellow stripes, lies about 4 miles northeastward of Billean Island. This buoy, equipped with a radar reflector, marks the northeast dangers extending from Billean Island, and is on the southwest side of the recommended track.

Between Billean Island and the coast of Borneo, southwestward of it, there is a chain of reefs on which there are several cays. PULAU TIGIPIL, a densely wooded and conspicuous islet, about 90 feet high to the tops of the trees, lies on this chain about midway between Billean Island and the coast. BANGKURUAN CAYS, two small wooded cays about 35 and 65 feet high to the tops of the trees, lie on this chain about 2 miles southwestward of Pulau Tigipil and about 2 1/2 miles from the coast.

A sand cay, about 4 feet high, surrounded by a coral reef, lies about 5 miles south-southeastward of Billean Island.

11-16 BILLEAN SOUTH DANGERS are a group of coral reefs lying from 7 to 11 miles east-northeastward of Billean Island and northeastward of the recommended track. They consist of a 2-fathom patch, about 9 miles northeastward of Billean Island; SUNBEAM ROCK, with a depth of 1 1/2 fathoms, about 7 miles east-northeastward of Billean Island, with another 1 3/4-fathom patch about 1 1/2 miles farther in the same direction;

PAKNAM SHOAL, with a depth of less than 3 fathoms, about 3 1/2 miles eastward of the 1 3/4-fathom patch and 12 miles east-north-eastward of Billean Island; and a 4 1/2-fathom patch lying about 1 3/4 miles south-southwestward of it. All these shoals are steep-to and probably have less depths over them. The recommended track shown on the chart has been followed with safety, but in such reef-strewn waters, UNCHARTED DANGERS may exist.

11-17 MARCHESA BAY lies to the eastward of Pulau Jambongan between the chain of reefs extending west-southwestward from Leonan Cay to that island and the chain of reefs extending from Billean Island south-westward 9 1/2 miles to the coast.

Between these chains of reefs the bay is from 10 to 12 miles wide, with depths in the entrance of 10 to 17 fathoms, over mud and shells, decreasing gradually southwestward to the shore. The shore of the bay is fringed with sandbanks and reefs, which dry, from 1/2 mile to 2 3/4 miles offshore.

There are numerous reefs within the bay, but the approach to the logging settlement entered between the south end of Pulau Jambongan and Tanjong Kinulubaltan is free from dangers.

Claire Rock, marked by a red and white BEACON, lies about 3 miles south-southeast of Leonan cay.

Green Patches, a group of coral heads, lies about 5 miles south-southeast of Leonan cay.

March Reef, which dries about 1 foot and is surrounded by dangers with less than 6 feet over them, lies about 6 1/2 miles south of Leonan cay. Sealark Reef, which dries about 1 foot, lies about 1 1/2 miles southwest of March Reef.

The channel to the logging settlement is about 1/3 mile wide, with depths of 4 to 10 fathoms. This channel is marked by five

BEACONS. A bar, about 2 miles wide, and with a least depth of 15 feet (1954), fronts the entrance of the channel which leads along the southeast side of Pulau Jambongan as far as the red cliff (sec. 11-10), beyond which it appears to become shoal. Shallow banks lie to the southward of this channel and an extensive bank of sandy mud, which dries, lay, in 1881, about 1 mile southward of the red cliff. About 5 miles south-southwestward of Tanjong Kinulubaltan and southward of this extensive bank lies the estuary of the Sungei Paitan, a small river. Three small islands lie in this estuary, and about 4 miles to the westward is a larger wooded island. The coast and the waters lying to the westward of this extensive bank have only been partially examined.

11-18 PULAU LANKAYAN (6° 30.5' N., 117° 55' E.), about 11 miles southeastward of Billean Island, is an islet about 110 feet high to the tops of the trees. It lies on the southwest end of a coral reef. Numerous dangers with depths of 1 fathom to 6 fathoms lie within 1 1/2 miles east and west, and 4 miles southwest, respectively of the islet. These dangers also extend about 10 miles southwest of Pulau Lankayan. A beacon, about 1 3/4 miles southwest of Pulau Lankayan,

De Courcy Dangers, with depths of 2 1/4 to 9 3/4 fathoms, lie from about 2 to 5 miles north of Pulau Lankayan. The northernmost of these shoals, with a least depth of 3 fathoms, lies about 1/3 mile northeast of the recommended track and is marked by a spherical LIGHT BUOY, painted in red and white checkers and is equipped with a RADAR REFLECTOR.

MILLER ROCK, with a least depth of 4 1/4 fathoms, lies on the northeast side of the recommended track about 6 miles northeast of Pulau Lankayan.

KECHIL REEF, a coral patch, with a least depth of 3 fathoms and steep-to, lies about 7 miles northeastward of Pulau Lankayan on the northeastern side of the recommended track.

KESTREL SHOAL, with a least depth of 1 1/3 fathoms, lies on the southwestern side of the track, 4 miles eastward of Pulau Lankayan.

11-19 COAST.—From Tanjong Kinulubaltan (6° 38' N., 117° 31' E.) the coast trends southeastward 18 miles to Tanjong Siasib, the eastern extremity of Torongohok Island, which lies close off the coast. A reef fringes the shore to a greatest distance of about 2 1/2 miles. From Tanjong Siasib the coast trends southward for 11 1/2 miles to Tanjong Niug, where it recedes to the westward forming Labuk Bay. The shores of Marchesa Bay consist mostly of mangrove swamps backed by dense jungle. The remaining coastline is sandy and backed by casuarina trees, except in the vicinity of the mouths of the river.

11-20 OFF-LYING ISLANDS AND DANGERS—KESTREL SHOAL TO SANDAKAN APPROACH INCLUDING LABUK BAY.—The recommended track that passes between Kestrel Shoal and Kechil Reef continues in a general southeasterly direction and passes to the northeastward of the TURTLE ISLANDS, which are a chain of islands and dangers stretching to a greatest distance of 16 1/2 miles north-northeastward and northeastward from Tanjong Pandaras (6° 04' N., 117° 59' E.). LABUK BAY lies between these dangers and the indented coast lying to the westward. The recommended track continues in the same direction passing northeastward of the dangers lying southeastward of the Turtle Islands and thence passing between Taganak Island and Taganak Patches, which mark the approach to Sandakan, and are

located 20 and 16 miles, respectively, eastward of Tanjong Pandaras.

PULAU BO-ANN (BOOAN ISLAND), about 255 feet high to the tops of the trees, is the northernmost of this chain of islands and lies about 14 miles north-northeastward of Tanjong Pandaras (Pisau), the southeast entrance point of Labuk Bay. It is surrounded by a reef and is densely wooded.

Powell Shoal, with a least depth of 4 1/4 fathoms, lies about 1 1/2 miles northeast of the island.

Pulau Sibaung, about 40 feet high to the tops of the trees, lies about 4 miles west-northwest of Pulau Bo-ann. Glen Shoal, with a least depth of 5 fathoms, lies about 2 miles north-northeast of Pulau Sibaung.

FLYING FISH ROCK, with a depth of 1 1/2 fathoms, and steep-to, lies 2 1/2 miles eastward of Bo-ann and about 2 1/3 miles southwestward of the recommended track.

A SHOAL, with a least depth of 2 1/3 fathoms, lies to the southwestward of Flying Fish Rock, and about 1 3/4 miles east-southeastward of Bo-ann.

PULAU LIHIMAN, an island about 220 feet high to the tops of the trees and densely wooded, lies 2 3/4 miles southward of Bo-ann. It is surrounded by a CORAL REEF that extends about 3/4 mile northeastward. An islet, about 65 feet high to the tops of the trees, lies on the outer edge of this reef.

Lihiman and Bo-ann are mud volcanoes. Lihiman was active in 1952.

PULAU LANGAAN, about 90 feet high to the tops of the trees, is located about 4 1/2 miles east-southeastward of Pulau Lihiman. It is surrounded by a reef that extends 1 mile northwestward and northward, 1 1/4 miles northeastward, and 1/2 mile southeastward. A sandbank, 5 feet high, lies about 1/2 mile from the islet on the eastern edge of the reef.

JOHNSON ROCK, a coral patch with a least depth of $1\frac{1}{3}$ fathoms, lies about $2\frac{1}{4}$ miles northeastward of Pulau Langaan. Several shoal patches, with depths of less than 6 fathoms, extend west from Johnson Rock. A 28-foot patch lies about $1\frac{1}{4}$ miles eastward of the rock and about $\frac{1}{2}$ mile southwestward of the recommended track.

Several PATCHES, with depths of $3\frac{1}{4}$ to 10 fathoms, lie about 3 miles north-northeastward of Pulau Langaan and about 1 mile southwestward of the recommended track.

A coral patch with a least depth of 28 feet lies about $4\frac{1}{2}$ miles east-southeast of Pulau Langaan. An $8\frac{3}{4}$ -fathom patch lies about 1 mile north of this 28-foot patch.

GREAT BAKKUNGAAN and LITTLE BAKKUNGAAN are two wooded islands, fringed with coral reefs, about 145 and 100 feet high to the tops of the trees, respectively. These islands lie, respectively, about $1\frac{3}{4}$ and 3 miles southwestward of Pulau Langaan.

The boundary between North Borneo and Philippine territorial waters passes between Great and Little Bakkungaan Islands; Taganak Island also lies in Philippine waters.

The passage between Great Bakkungaan and Pulau Langaan is encumbered with reefs and shoals, with depths of 4 to 36 feet. A reef, which dries in patches, lies about $\frac{1}{2}$ mile northwest of Great Bakkungaan. Two shoals, each with a least depth of 3 feet, lies about $1\frac{1}{2}$ and 2 miles, respectively, northwest of Great Bakkungaan. Shoals, with depths of less than 6 fathoms, extend east and southeast from Little Bakkungaan.

Pulau Silingaan, about 100 feet high to the tops of the trees, lies $3\frac{1}{4}$ miles west-northwest of Great Bakkungaan, and within the 10-fathom curve. The islet is fringed with coral, and foul ground extends about $\frac{3}{4}$ mile northwest from it.

Shoals and reefs lie between Pulau Silingaan and Great Bakkungaan.

TURTLE ROCK, with a least depth of 11 feet, lies about 2 miles north-northwest of Pulau Silingaan.

A LIGHT is shown from a white metal framework tower with red bands on the south extremity of Pulau Silingaan.

PULAU GULISAAN, an islet with a conspicuous clump of trees, 76 feet high, lies on the southern edge of a CORAL REEF about $1\frac{1}{2}$ miles south-southwest of Pulau Silingaan, within the 6-fathom curve fronting the coast.

PULAU LIBARRAN, a wooded island surrounded by reefs and about 140 feet high, lies between Pulau Gulisaan and the coast, and about $3\frac{1}{4}$ miles northeastward of Tanjong Pandaras. From the island a CORAL REEF extends $1\frac{1}{4}$ miles eastward. Black Rock, about 75 feet high to the tops of the trees, lies near the outer end of this reef and White Rock, 6 feet high, lies about $\frac{1}{2}$ mile west-southwest of Black Rock. The reef extends west from the island for about $\frac{3}{4}$ mile with Pulau Bonting, 59 feet high, lying near its extremity. About $\frac{1}{3}$ mile north-westward of this small islet is a rock, which dries 2 feet, and almost $\frac{1}{2}$ mile northeastward is TREE ROCK, 20 feet high.

TAGANAK ISLAND, about 450 feet high and wooded, lies about 20 miles eastward of Tanjong Pandaras and marks the outer approach to Sandakan. The island is about 1 mile long in a north-northeasterly and opposite direction and about $\frac{1}{2}$ mile wide. It is surrounded by a reef, which extends about $\frac{1}{2}$ mile offshore in places.

Taganak Island is a sub-port of entry of the Philippines and is administered by the Bureau of Customs for enforcement of customs laws on smuggling.

Deratting Exemption Certificates only are issued at Taganak Island.

An abandoned lighthouse tower stands on the summit of the island.

TAGANAK PATCHES, with depths of $4\frac{1}{2}$ to 10 fathoms, lie with the shoalest part almost $4\frac{1}{2}$ miles west-northwestward of the light on Taganak Island. Tide rips occasionally occur in the vicinity.

A $4\frac{1}{4}$ -fathom patch lies to the north-westward of Taganak Patches, and about $6\frac{1}{2}$ miles west-northwestward of Taganak Island.

GUBBINS ROCK, with a depth of 7 feet, and steep-to, lies about 7 miles westward of the southern tip of Taganak Island. A 2-fathom patch lies about 600 yards southward of Gubbins Rock.

A black and white beacon stands on the south extremity of Gobbins rock.

About 2 1/2 miles southwestward of Gubbins Rock and in the northern approach to Sandakan, there is a CORAL SHOAL, with a depth of 1 1/2 fathoms, lying about 1/5 mile outside the 10-fathom curve fronting the coast.

11-21 OUTLYING ISLAND AND DANGERS.—Clotilde Rock, a small CORAL REEF 2 feet high, and steep-to, lies about 9 1/2 miles north-northeastward of Taganak Island, and about 8 1/2 miles northeastward of the recommended track shown on the chart.

A SHOAL, with a least depth of 1 1/2 fathoms, lies about 1/2 mile southwestward of Clotilde Rock.

BAGUAN ISLAND, 228 feet high and densely wooded, is located about 7 3/4 miles eastward of Taganak Island. It is surrounded by a CORAL REEF that extends about 3/4 mile offshore in places. SHOAL DEPTHS extend about 2 1/4 miles east-northeastward from the northern extremity of the island.

Laurel Rock, 6 feet high, lies about 3 1/4 miles north-northeastward of Baguan Island.

In 1907, a vessel struck a PINNACLE ROCK, over which there was a depth of 3 fathoms located about 2 miles northwestward of Baguan Island.

11-22 LABUK BAY is entered between Pulau Pura-pura, a small wooded island, located close northeastward of Tanjong Niug, and the chain of islands and reefs extending north-northeastward from Tanjong Pandaras for a distance of 16 1/2 miles. The bay is encumbered with numerous sandbanks, which render navigation dangerous even for small craft. The western side of the bay is densely wooded and many small creeks indent the shore. Three rivers—the Sungei Bongaya, the Sungei Kalagaan, and the Sungei Kalapis—empty into the west side of the bay. The latter river is named the Sungei Labuk within a few miles of the entrance.

The village of BALMORAL lies within the entrance to the Kalapis River on its southern bank and is a government station. Two other small villages lie on the southwestern part of the bay.

The southeastern side of the bay is densely wooded and is fringed by islets and rocks, which extend some distance off shore.

11-23 LANDMARKS.—TANJONG NIUG (6° 15' N., 117° 43' E.) is a well-defined point covered with trees, about 150 feet high. About 8 miles northwestward of the point are Quoin and Flat Hills, 650 and 630 feet high, respectively. The northern part of Pulau Torongohok, which lies in the southwestern part of the bay about 11 1/4 miles southward of Tanjong Niug, is covered with casuarina trees, 140 feet high, and is conspicuous when approaching from the northeastward.

ISLETS.—Northward of Tanjong Pandaras are some low islets, which are merely clumps of mangroves on the fringing reef, that extends about 3/4 mile northward and 2 1/4 miles eastward from Tanjong Pandaras. PULAU BANKAWAN, about 100 feet high to the tops of the trees, lies outside this fringing reef and about 1 1/2 miles northeastward of Tanjong Pandaras.

Pulau Tikus, a wooded pyramidal-shaped island, 185 feet high to the tops of the trees, is located about 1 mile west-northwestward of Tanjong Pandaras. A rock, which dries 8 feet, is located about 1/2 mile northward of Pulau Tikus.

Pulau Gusong, a small sandy and treeless islet, about 2 feet high, lies at the northeastern extremity of a large sandbank near the middle of the bay, about 10 miles westward of Tanjong Pandaras.

A chain of islets, of which Torongohok is the northernmost, lies in the southwestern part of the bay.

11-24 CHANNELS.—There is a narrow channel on the northwestern side of the bay leading to the Sungei Bongaya, and one on the southeastern side, with a least depth of 1 1/2 fathoms, leading to the Sungei Kalapis. These channels are used by small boats with local knowledge.

11-25 CURRENTS.—The maximum rate of the ebb stream observed in the Sungei Labuk was 3 knots. The tidal influence is felt for a distance of about 20 miles from the entrance.

11-26 COAST.—The coast between Tanjong Pandaras and Tanjong Papat, about 16 miles southeastward, is low, densely wooded, and intersected by numerous streams. It is fronted by reefs and shoal water which extend to a greatest distance of 5 miles from the shore within the 3-fathom curve.

Pulau Nunuyan Laut and Pulau Nunuyan Darat are two low wooded islands almost connected with the coast, and located about 4 miles north-northwestward of Tanjong Papat. These islands, surrounded by reefs, extend about 2 1/4 miles northeastward from the coast and form shallow bays on either side.

PULAU BERHALA extends about 2 miles northward from its southern extremity located about 1 mile northeastward of Tanjong Papat and has a greatest width of about 3/5 mile. Its southeastern side marks the northwestern side of the entrance to Sandakan Harbor. The northern part of the island is low and very narrow. The southern part rises in two conspicuous hills, 591 and 549 feet high, which slope gradually to the westward. The eastern faces of these hills are imposing precipices with two white streaks running perpendicular from top to bottom.

A 2 fathom shoal lies on the northern side of the channel, about 1 3/4 miles northeastward of the white streaks.

APPROACH LIGHT BUOY.—A light buoy, painted in red and white horizontal stripes, equipped with a radar reflector is moored in 4 fathoms of water, about 7 1/4 miles northeastward of Pulau Berhala.

PULAU BERHALA LIGHT is shown from a white steel framework tower, 65 feet high, located atop the cliffs on the eastern side of the island.

A quarantine station is located on the west side of Pulau Berhala.

11-27 SANDAKAN HARBOR comprises the area lying between the indented coast extending in a general southwesterly direction from Tanjong Papat (5° 50.8' N., 118° 07.9' E.) and the low land extending southward from Tanjong Aru, the broad point, lying about 2 miles east-southeastward. Pulau Bai, an island 315 feet high, lies about 4 miles south-southwestward of Tanjong Papat and forms the south part of the fully examined harbor.

The HARBOR ENTRANCE lies between the southeastern side of Pulau Berhala and Tanjong Aru lying about 1 1/2 miles southeastward. The width at the entrance between the 6-fathom curves is about 1 1/10 miles.

The harbor extends southward and westward of Pulau Bai a distance of 15 miles from the entrance, but the only part accurately surveyed is that northward of Pulau Bai and the northern approach to Sapagaya Bay, located on the southern shore about 9 miles southward of Tanjong Aru.

The limits of the port are bounded by a line drawn in a 115° direction from the northern point of the island of Berhala to the eastern extremity of Tanjong Aru, and include the rivers and arms of the harbor as far as navigable.

11-28 DEPTHS.—A bar of mud, about 5 3/4 miles wide within the 6-fathom curves, fronts the entrance of the harbor and has a controlling depth of 25 feet (1965). A vessel drawing 29 feet entered the port (1965).

From the entrance to Sandakan Harbor the depths shoal gradually from 16 fathoms to 7 fathoms at the anchorage, lying on the northern side of the harbor.

11-29 PILOT.—In late 1958 the government pilotage service was withdrawn. A 1961 report states that government pilotage was maintained throughout the year.

11-30 ASPECT.—The northern shore of the harbor rises to many summits conspicuous from seaward, of which the highest is Bukit Mekarah (Three Peaked Hill), 850 feet high, located about 2 1/4 miles westward of Tanjong Papat. These hills slope gradually on their northern and western sides and are generally steep-to on their south and east sides. A radio mast with an obstruction light is located about 182 yards north-northwestward of the summit of Bukit Mekarah.

11-31 NORTHWESTERN SIDE OF HARBOR.—From Tanjong Papat, the coast trends in a southwesterly direction for a distance of about 1 mile to the government pier. Two mooring buoys are moored within the 5-fathom curve about midway along this section of coast. Between this pier and Pavitt Point, about 3 miles southwestward, there is an

(5138) **BORNEO—Northeast coast—Sandakan Harbor—Wreck information.**—1. A depth of 4 fathoms 2 feet "*Foul*" will be substituted for the 2-fathom 8-foot "*Wk*" in (approx.) 5°50'08'' N., 118°07'10'' E.

2. The green buoy close southwestward of (1) will be expunged.

(N.M. 32/66.)

(N.M. 27 (1219), London, 1966.)

H.O. Chart **2800 (Plan)**.

H.O. Pub. 71, 1951, page **266a**.

extensive bight. Allard Bank, a shoal area, nearly fills this bight, leaving a small pocket at its east end where the least depth is 2 1/2 fathoms. The area to the westward and southward of Pavitt Point has not been fully examined. A conical buoy, painted in black and white vertical stripes and a white topmark, is moored within the 6-fathom curve near the southeast edge of Allard Bank. Another conical buoy, painted in black and white horizontal bands, is moored about 500 yards southwestward of the T-headed pier at Pavitt Point. The pier can accommodate vessels of 10,000 D.W.T with a length of about 400 feet and a draft of 24 feet. The channel to the pier has depths of 20 feet at the outer bar and 24 feet at the terminal. During the northeast monsoon swells up to 6 feet can be expected on the bar. A red and white beacon stands nearly 1 mile southwestward of the above mentioned pier and marks the southwest side of two small reefs, which dry to 6 feet.

A light beacon is located on the northeast end of the government pier at Sandakan. The beacon consists of a white steel column.

11-32 EASTERN SIDE OF HARBOR.—From the shore eastward of the entrance, an extensive flat projects seaward in a north-easterly direction for a distance of about 7 miles from Tanjong Aru within the 3-fathom curve. The eastern side of the harbor is formed by a large island, low and densely wooded and separated from the main coast

to the southward by a channel named Trusan Duyong. From this channel the east shore of the harbor trends in a general southerly direction about 6 miles to Sapagaya Bay.

A narrow channel, that passes to the eastward of Pulau Bai, connects the main part of Sandakan Harbor with Sapagaya Bay lying to the southward.

A white tripod beacon with a black conical topmark, 20 feet high, stands on a rock, 2 feet high, near the eastern extremity of the rocks bordering the channel and extending about 400 yards eastward of Pulau Bai.

Borneo Rock, with a depth of 4 feet, lies on the eastern side of the channel about 2 miles southward of the above mentioned beacon.

11-33 DANGERS.—Atjeh Rock, with a depth of 2 1/3 fathoms, lies about 1/3 mile east-southeastward of the government pier. A light is shown from Atjeh Rock.

An obstruction with 4 1/4 fathoms over it lies about 200 yards southward of the southwest end of the wharf.

A wreck, with 4 1/3 fathoms over it, lies about 200 yards southward.

A depth of 4 1/2 fathoms exists about 1 2/5 miles southwest by south of Pavitt Point.

Elton Bank, an extensive area of shoal water, extends almost 1 3/4 miles northeast from Pulau Bai. The northern limit of this shoal area, within the 6-fathom curve surrounding Pulau Bai, lies about 1 1/2 miles south-southeastward of the government pier.

11-34 Anchorages.—The most convenient anchorage is about 700 yards southward of the government pier, in a depth of 7 to 9 fathoms.

The quarantine anchorage lies on the east side of the harbor with its center nearly 2 miles eastward of the light on the government pier. The approximate $\frac{1}{4}$ by 1 mile area is bounded as follows: from position $5^{\circ}50'34''$ N., $118^{\circ}09'42''$ E. a line drawn $\frac{3}{4}$ mile 270° ; thence $9/10$ mile 221° ; thence 1 mile 90° to shore.

The explosive anchorage lies immediately southwestward of the quarantine anchorage. It is bounded as follows: from position $5^{\circ}49'10''$ N., $118^{\circ}09'04''$ E. about $1\frac{1}{3}$ miles 270° ; thence about 1 mile 41° joining the south boundary line of the quarantine anchorage.

Anchorage is prohibited within an arc of a circle extending about $\frac{1}{3}$ mile seaward from the Government Wharf light structure.

Regulations.—In brief, regulations applicable to this port are as follows:

1. **Quarantine:** The Maritime Declaration of Health is to be filled out and handed to the boarding officer of the Marine Department who will require copies of the crew and passenger lists. The Port Health Officer will not board unless the vessel comes from an infected port.

2. **Immigration:** The Immigration Officer will board on arrival and clear her inwards. There are no restrictions on crew and passengers going ashore.

3. **Wharf priority:** Vessels of the Straits Steamship Company have priority at the wharf. The berth is filled by vessels of this company from 1700 Saturday to 1700 Sunday, and from 0700 Wednesday to 2400 Thursday.

4. **Berthing:** Vessels may not berth alongside after dark without special permission, but they may leave the wharf, having given prior notice. Before repairs are carried out on main engines which would prevent vessel from shifting, the Harbor Master must be informed in writing.

5. **Explosives:** No vessel carrying explosives shall come within 500 yards of the

shore or any other vessel except with the written permission of the Harbor Master.

11-35 Tides.—The mean high-water interval at Sandakan is 11h. 07m. The rise of the tide at tropic higher high water is 6.8 feet, and the rise at equatorial high water is 5.8 feet.

11-36 Tidal currents.—The tidal currents turn at the times of high and low water by the shore, the ebb attaining a maximum rate of 2 knots and the flood of $1\frac{1}{4}$ knots. Alongside the pier the current frequently sets in the reverse direction to that in the harbor.

Tidal current signals.—A tidal signal, consisting of a cone or a ball, is hoisted on a small mast on the roof of the Customs House to show the state of the tide to vessels approaching the wharf. A cone, point down, signifies flood tide; a cone, point up, ebb tide; a ball, slack water.

11-37 Directions.—Vessels approaching Sandakan, after passing between Taganak Island and Taganak Patches, should steer for the approach light buoy moored about 7 miles north-eastward of Pulau Berhala light structure. Having passed the buoy close aboard, steer 218° for the south extremity of Pulau Berhala. This leads over the bar with a least depth of 4 fathoms. When the bar is crossed and depths of $5\frac{1}{2}$ to 6 fathoms are obtained, vessels should alter their courses a little to the southward and pass about $\frac{1}{2}$ mile eastward of the south extremity of Pulau Berhala and thence to the anchorage, avoiding Atjeh Rock.

11-38 SANDAKAN ($5^{\circ}50'$ N., $118^{\circ}07'$ E.), formerly Elopura, the chief port on the northeastern coast of Borneo, stands on the northern shore of Sandakan Harbor about $\frac{3}{4}$ mile southwestward of Tanjong Papat. Most of the trade is carried on with Hong Kong and through Singapore with Europe. Sandakan is the center of the timber industry of the east coast of Borneo; copra is also exported. The population in 1960 was about 28,806.

Berths.—The government wharf, 740 feet long and 40 feet wide, can accommodate one 10,000-ton ship and one 3,000-ton ship alongside the outer berth. The minimum depth maintained alongside by dredging is 21 feet (1961). A ship with a draft of $21\frac{1}{4}$ feet berthed at the wharf in 1961. The inner berth with a least depth of 8 feet (1961) can accommodate two coastal vessels.

All vessels must load or discharge cargo at this wharf unless written permission to do so elsewhere has been obtained from the Superintendent of the Customs.

A small pier for coasters is located near the western end of Sandakan.

The entire waterfront is lined by a concrete seawall, with an alongside depth of 10 feet near the government wharf.

A new Shell Oil wharf at Pavitt Point went into service in 1959. This is a T-head pier extending offshore about 500 feet. The head is about 125 feet long with 450 feet between the mooring dolphins. This berth had a least depth of 27 feet (1961) and can accommodate one 3,000-ton vessel.

Several tugs and lighters are available in the harbor.

Repairs.—There is a foundry and shipbuilding yard where small repairs can be undertaken. There is an overhead crane of 15 tons capacity.

Marine railway.—There is a marine railway, 145 feet long on blocks, and with a lifting power of 600 tons.

Supplies.—Water is laid on to the government pier. Fresh vegetables and fish are available in moderate quantities, advance notice should be given for large amounts. Diesel and lub. oil can be had in small amounts, but no fuel oil. Deck and engine supplies are available in limited quantities.

Communications.—Frequent communication is maintained between Sandakan and other ports in North Borneo. There is also steamship communication with Java, Singapore, Hong Kong, Japan, Taiwan, Sydney, and Manila.

There is regular air service to Labuan. An internal air-line provides service in North Borneo, Sarawak, and Brunei and links all the main settlements.

Sandakan is connected to the North Borneo telegraphic system.

A radio station open for public correspondence is located in Sandakan.

Hospital.—There is a government hospital located here available to seamen.

Meteorological table.—See Appendix II.

11-39 DIRECTIONS—Mallawallé Channel to Sandakan Harbor.—Vessels generally follow the track line shown on *H.O. Charts 2796 and 2795* in proceeding from Mallawallé Channel to Sandakan. These directions are given below:

After passing northeastward of Passage Reef at a distance of about $\frac{1}{4}$ mile, keep the right extremity of Kukuban Cay in range with the summit of Tigabu Island, bearing 121° ; this is a good mark and is easily picked up.

When about $\frac{1}{4}$ mile distant from Kukuban Cay, alter course southward so as to pass between the foul ground lying to the south-eastward of Pulau Mandidarah and the reefs lying between Kukuban Cay and Tigabu Island. When about 4 miles west-southward of the northwest summit of Tigabu Island, alter course to about 095° and steer for Pulau Sipindung. When at a position $1\frac{1}{2}$

miles distant from the latter alter course to about 143° passing eastward of Gibson Reef. This is the narrowest part of the channel. When Sipindung bears about 020° alter course to about 125° running southward of Sandy Island and continuing until the beacon on the latter bears about 335° astern, then steer 155° . Round Pole Reef and steer about 105° passing northward of Sedgeman Rock. When clear of the latter alter course slightly to the southward and pass about 1 mile northeastward of the buoy marking the 3-fathom patch at the northeastern extremity of the dangers extending northeastward from Billeen Island.

After passing the buoy follow the track line passing between Kechil Reef and Kestrel Shoal; thence steer 145° for Taganak Island. When about 2 miles from Taganak Island alter the course to pass between Taganak Island and Taganak Patches and then steer for the approach light buoy moored about 7 miles northeastward of Pulau Berhala. Having passed the buoy close aboard, steer 218° for the southern extremity of Pulau Berhala. Thence be guided by the directions for Sandakan Harbor in section 11-37.

11-40 Caution.—The recommended track has been followed with safety, but there may be less water on some of the shoals than charted and other dangers not charted may exist.

It should be borne in mind also that no reliance can be placed on the positions of the sand cays which have no vegetation on them; the action of the sea frequently causes them to shift considerably and even disappear. The beacons are often difficult to make out.

11-41 Tidal currents.—Off the coast between Mallawallé Channel and Sandakan Harbor, no regular tidal current was perceptible, but when the northeast monsoon blew steadily there appeared to be a constant set to the northwest.

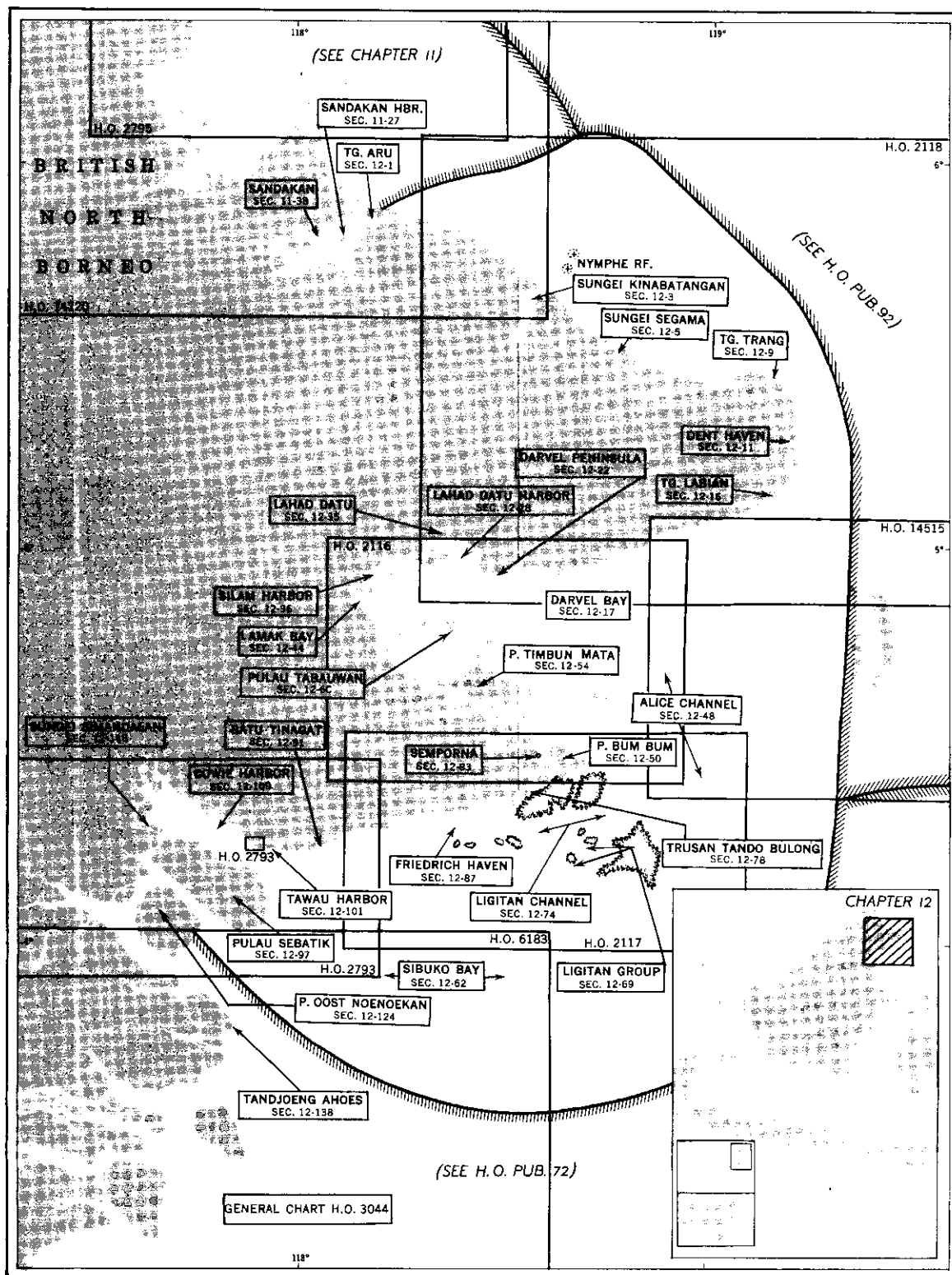
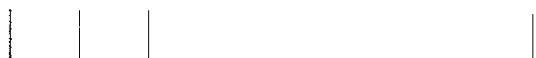


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Naval Oceanographic Office.
Numbers refer to the section in the text describing a designated locality.

CHAPTER 12—GRAPHIC INDEX



NORTHEAST COAST OF BORNEO FROM SANDAKAN HARBOR TO THE SEBOEKOE RIVER

12-1 GENERAL REMARKS—COAST—Between Tanjong Aru, the southeastern entrance point to Sandakan Harbor, and Tanjong Un-sang, about 65 miles east-southeastward, and thence 10 miles southward to the entrance to Dent Haven, the coast is very low flooded land, covered with dense jungle and forest, principally casuarine trees, from 150 to 180 feet high, fronted by a narrow sandy beach. Between Tanjong Aru and the entrance to the Sungei Kinabatangan, about 30 miles east-southeastward, the coast is intersected by numerous streams, some of which are reported to lead into the river and to be navigable for boats.

12-2 Aspect.—About 22 1/2 miles south-eastward of Tanjong Aru and about 11 miles from the coast are the Kinabatangan Hills, 963 feet high. These hills appear from seaward as a long range with a slight peak. Confusion Hill, about 4 1/2 miles southeastward of Kinabatangan Hills, shows a round top when viewed from the northeastward. Agua Peak, located about midway between Confusion Hill and the coast northeastward of it, is 638 feet high, and from the eastward appears as a double cone. Notch Hill, about 10 miles east-southeastward of Confusion Hill and 8 1/2 miles from the coast, is 803 feet high, and is the most conspicuous hill in the vicinity of the Sungei Kinabatangan. It has a sharp and steep fall near its summit.

Mount Hatton (5° 15' N., 118° 42' E.), 1,990 feet high, located about 16 miles south-southeastward of Notch Hill, is the most conspicuous mountain on the coast, appearing with a sharp peak from all directions. About 7 miles westward of Mount Hatton lies Ragged Hill, 1,455 feet high, and appearing as two cone-shaped hills when viewed from the eastward.

Mount Bagahak, 2,740 feet high, lies in the center of a long sloping range, and is located

about 12 1/2 miles south-southeastward of Mount Hatton.

12-3 SUNGEI KINABATANGAN, with depths of 3 3/4 to 5 fathoms, is about 3/5 mile wide at its entrance. The bar, that extends 3 1/2 miles seaward, has a depth of 1 1/2 fathoms at low-water springs. Vessels not having local knowledge and drawing more than 8 feet should not attempt to cross the bar, as the tides are much influenced by the winds, rendering the time of high water uncertain.

Driftwood Point, the eastern entrance point of the river, is wooded and appears from seaward as a sharp and well-defined point.

A light is shown from a position about 1 1/2 miles west by northward of Driftwood Point on the west side of the river entrance.

From the entrance the river trends south-westward and then southward for 5 miles to Dewhurst Bay, which is 3 miles long and 1 mile broad, having depths of 1 to 2 fathoms. The main branch of the river turns to the westward at 5 miles from the entrance, from whence it was examined for a distance of 6 miles. The river at this distance is about 300 yards wide, with a depth of 2 1/2 fathoms. Depths of 1 1/2 to 6 fathoms are found in this stretch of the river. No villages are found along the river but there are settlements and rubber plantations farther upstream along the unexamined portion of the river.

12-4 Off-lying dangers.—Royalist Rock, with a least depth of 6 feet, coral, near its southwestern end and steep-to, lies about 4 3/4 miles north-northeastward of Driftwood Point.

Nymphe Reef, about 3/4 mile in extent, with a depth of 1 foot, coral and sand, lies 6 miles north-northeastward of Driftwood Point. Being within the limit of the discolored water from the Sungei (continued on page 270)

Kinabatangan, the reef is seldom seen, but is marked by a slight ripple. In heavy weather the seas break over it.

Patches with depths of 5 3/4 and 7 fathoms lie between Nymph Reef and Royalist Rock.

Pegasus Reef, 14 miles northeastward of Driftwood Point and 9 1/2 miles east-northeastward of Nymph Reef, has a least depth of 3 feet, and is composed of live coral with patches of sand. A light buoy, painted in red and white horizontal bands, is moored on the north-northeast side of Pegasus Reef. The reef is about 1 1/2 miles long in a north and south direction and about 1 1/4 miles wide within the 6-fathom curve surrounding it.

A Beacon stands on a sunken rock near the north extremity of Pegasus Reef.

Benrines Reef, with a least depth of 4 1/2 fathoms, is reported to lie about 7 1/2 miles northwestward of Pegasus Reef.

Caution should be exercised when navigating in the vicinity of Pegasus Reef, as numerous other dangerous shoals have been reported.

12-5 Coast—Driftwood Point to Pulau Tambisan.—Between Driftwood Point and the mouth of the Sungei Segama, about 13 miles southeastward, the coast is covered with jungle, and is bordered by a belt of grass and bushes.

The Sungei Segama is about 1/2 mile wide at its entrance, and has a depth of about 2 1/2 fathoms. A shallow flat, over which there is a depth of 1 1/2 fathoms at high water springs, extends about 3 miles offshore from the mouth of the river. About 2 miles inside the entrance there is an island, southward of which the river splits up into several creeks with depths of 2 to 3 fathoms. The river, which owes its only importance to the fact that rubber and tobacco plantations are found along its unexamined portion well upstream, is encumbered with shifting sandbars and other dangers and can be used only by small craft with local knowledge.

The entrance to the Sungei Maruap lies about 8 1/2 miles southeastward of the eastern entrance point of the Sungei Segama. The river is about 3/4 mile wide, with depths of 3 to 5 fathoms, between the entrance points. There is a least depth of 1 3/4 fathoms over the bar which extends 3 1/4 miles offshore from the entrance. Caution is necessary in crossing the bar as the sea breaks on it during southeasterly winds. About 3 miles inside the entrance is Evans Island, where the river divides into several branches.

Pulau Tambisan, about 9 miles eastward of the eastern entrance point of the Sungei Marowop, is of a uniform height of 60 or 70 feet, with the tops of the trees on the uncleared portion about 200 feet high. The island is about 3 miles long in an east and west direction and 1 1/4 miles wide, and is fronted by a coral reef up to a distance of 3/4 mile. A narrow channel, which is only navigable by small craft and which affords a safe anchorage for small craft, separates the island from the coast of Borneo. The western extremity of the island is easily distinguished from seaward, but the eastern extremity is low.

Tangusu Bay, a shallow bight formed by the receding coast and protected to the northeastward by Pulau Tambisan, lies southwestward of the island. A rock with a depth of 4 feet, lies in this bay about 1 mile southwestward of the southwestern extremity of Pulau Tambisan.

12-6 Tidal currents.—Between Sandakan Harbor and Pulau Tambisan the flood current sets to the northwestward and the ebb to the southeastward; the tidal current is slight, running rarely as much as 1 knot.

At a distance of 10 miles from the coast and during the southwest monsoon the regular southeasterly current of 1 to 2 knots makes itself felt, and the northwesterly set is not experienced, only a slackening of the current during the flood tide.

12-7 Off-lying dangers and banks.—Rene Shoal, with a least depth of 3 fathoms, coral and sand, extends northwestward about 4 1/4 miles from a position located about 3 miles east-northeastward of the east extremity of Pulau Tambisan and has a breadth of about 1 1/2 miles within the 10-fathom curve surrounding it.

Gem Reef, with a least depth of 3 feet, coral and sand, near its center, lies to the northward of Rene Shoal and extends about 1 1/2 miles northward from a position located about 6 3/4 miles north-northeastward of the northwest extremity of Pulau Tambisan and has a greatest breadth of 2 3/4 miles within the 10-fathom curve surrounding it.

Magpie Bank, with a least depth of 9 fathoms on its southwestern side, is an extensive bank of rotten coral with its southern extremity located about 14 miles northward of Pulau Tambisan. A 5-fathom patch was reported (1956) to lie about 1 1/2 miles west of the 9-fathom head on Magpie Bank.

Sunday Bank, over which there is a least depth of 6 1/2 fathoms, coral, near its western edge, lies to the northeastward of Magpie Bank and about 20 miles northward of Pulau Tambisan.

Normandy Bank, a shoal area with a least depth of 6 fathoms, coral, lies southeastward of Sunday Bank and extends north-northeastward 4 miles from a position located about 19 miles north-northeastward of Pulau Tambisan and has a greatest breadth of 1 3/4 miles within the 10-fathom curve surrounding it.

Sentry Bank, over which there is a least depth of 7 fathoms, is an extensive bank of sand and coral lying to the southeastward of Normandy Bank. The shoalest part of this bank lies about 16 miles northeastward of Pulau Tambisan.

Talantam Shoal, with a least charted depth of 5 fathoms, sand and coral, lies 7 1/2 miles eastward of Sentry Bank and extends about 3 miles northwestward from a position located about 24 miles northeastward of the eastern extremity of Pulau Tambisan, and has a breadth of 2 miles within the 10-fathom curve. Deep draft vessels should avoid this shoal as a depth of 4 1/4 fathoms was reported to have been found during favorable conditions when the bottom was clearly visible. It is probable that even less depths may be found on this shoal.

With the wind against the tide, heavy tide rips, which resemble broken water, are seen on this bank.

A shoal patch over which the least depth is 3 3/4 fathoms has been reported (1948) to lie southwestward of Talantam Bank and is located about 20 1/2 miles northeastward of the eastern extremity of Pulau Tambisan.

A shoal with a least depth of 5 fathoms was reported (1963) to lie about 33 miles northwestward of Talantam Bank, and is located about 40 miles north of the east extremity of Pulau Tambisan.

An unexamined area with a least known depth of 10 1/2 fathoms is located about 10 miles southeastward of Talantam Bank.

12-8 Currents.—During two days on Sentry Bank (in the month of August) the current was observed to set almost constantly between northeast and southeast, varying from 1/4 to 1 1/2 knots. The tidal currents appeared to exercise a decided influence on the strength and direction of the current.

Tidal currents.—The flood current was observed to set to the south and the ebb current to the north.

12-9 Coast—Pulau Tambisan to Dent Haven entrance.—From a point close southeastward of the southeastern extremity of Pulau Tambisan, the coast trends east-southeastward for 3 miles to Tanjong Unsang, where it curves gradually to the southward for 10 miles to Reef Point, which marks the northern side of Dent Haven. The coast is low, swampy, covered with dense jungle, and fringed by a narrow strip of coral that is steep-to.

Light.—Tanjong Trang Light is shown from an iron framework tower, 75 feet high, and is located about 1 1/4 miles southeastward of Tanjong Unsang.

12-10 Off-lying dangers in Dent Haven approaches.—Hull Rock, located about 1 1/2 miles northeast of Reef Point (5° 16.6' N., 119° 15.2' E.) has a least depth of 4 feet and the sea breaks over it at times. The rock lies on a long narrow bank of hard sand, with depths of 1 to 5 fathoms, that stretches nearly 1 1/4 miles northward and 1 mile southward from it.

A sandbank, awash, extends about 1/3 mile northward from a position about 600 yards east-northeastward of Reef Point, and has a greatest width of about 250 yards. A shoal patch, with a least depth of 2 3/4 fathoms, lies close to the northward of this sandbank.

A 4 1/4-fathom patch lies 1 mile east-northeastward of Reef Point.

Between the sandbank and the northern tongue of the shoal area surrounding Hull Rock, there is a channel 1/2 mile wide, with depths of 6 to 7 fathoms. This channel is not recommended as it is encumbered by a sandy patch, with a least depth of 3 fathoms, lying about 1 1/2 miles north-northeastward of Reef Point; the depths are irregular and many 3 1/2- and 4-fathom depths are found.

HARDY PATCH, a coral shoal with a depth of 3 fathoms, lies to the southeastward of Hull Rock and is located about 2 3/4 miles east-southeastward of Reef Point. It is marked by strong tide rips, and the water over it is usually discolored. This shoal is a danger not only to vessels approaching Dent Haven but also to vessels passing along

the coast at night or in thick weather. It may be avoided by passing vessels keeping outside the 20-fathom curve that lies about 1 1/4 miles eastward of it.

There are several patches, with depths of 2 3/4 to 3 fathoms, lying within 4/5 mile northward of Mangrove Point, which lies almost 2 miles south-southeastward of Reef Point and marks the southern entrance to Dent Haven.

12-11 Dent Haven, a small bay formed by the slightly indented coast and partially protected to the northeastward by the shoal grounds surrounding Hull Rock, is entered between Reef Point and Mangrove Point, about 2 miles to the southward. The bay is generally free of dangers and affords good anchorage during the southwest monsoon in depths of 3 1/2 to 4 fathoms, sand and mud. A slight swell sometimes sets into the bay. The southern part of the bay close inshore is foul.

Three brackish streams flow into the bay. The two northern streams are dry across their entrances at low water. In the southern stream, boats can find good shelter inside the spit in deep water, the entrance being through a narrow channel in the fronting reef. The whole shoreline of the bay is the barrier of a great swamp.

Reef Point, the northern entrance point of the bay, is fringed by a reef that extends about 150 yards from it.

Mangrove Point, the southern entrance point of the bay, is the northern extremity of an island covered with mangroves, lying close offshore. The island is fringed on its eastern and northern sides by a narrow reef.

12-12 Anchorage—Directions.—Anchorage is obtainable, in depths of 3 1/2 to 4 fathoms, sand and mud, anywhere in Dent Haven clear of the shoal patches mentioned above, but there are more regular depths in the northern part.

Vessels approaching the bay should pass in between the southern end of the shoal ground surrounding Hull Rock and Hardy Patch. The extremity of the coast lying southward of Mangrove Point should not be brought to bear less than 217° until the southern end of the long sandy

beach in the bay northward of Alfred Point, which lies about 2/3 mile west-northwestward of Mangrove Point, bears 255°. Vessels may now steer for a convenient anchorage.

12-13 Tides.—The mean high-water interval at Dent Haven is 6h. 34m. and the spring range is 3 1/2 feet.

12-14 Tidal currents.—Between Pulau Tambisan and Dent Haven, the tidal currents run at a rate of 2 to 3 knots, flood to the south and ebb to the north.

Between Dent Haven and Tanjong Labian, 7 miles southwestward of Mangrove Point, the currents run strongly, from 1 1/2 to 3 knots at times, flood to the south and ebb to the north, but the tidal currents are extremely variable in strength, and there is no certainty as to their direction. Occasionally the current was observed to run strongly in one direction for one or two days and then in the opposite direction for a day, for no reason that could be assigned. At other times the currents changed approximately at high and low water by the shore.

Farther westward on the north shore of Darvel Bay the tidal currents are weaker and run about 1 knot at springs, flood to the westward and ebb to the eastward.

In Dent Haven the tidal current begins to set to the northward 3 hours before high water and to the southward 3 hours before low water; it appears probable that this is an eddy.

12-15 Tide rips.—From Gem Reef south-eastward to Sibutu Passage frequent and sharply defined tide rips occur, which have the appearance of shoal water.

12-16 Coast—Dent Haven to Tanjong Labian.—From Dent Haven the coast curves very gradually for 7 miles to the southward and southwestward, forming a definite point at Tanjong Labian. In the vicinity of Dent Haven the coast is swampy and fringed by mangroves, but as it curves to the southward and westward the swamp gives way to a hard sand beach closely backed by jungle.

Several small streams find their way to the coast and there are occasional open spaces in the jungle.

12-17 DARVEL BAY AND APPROACHES.—Darvel Bay is located on the south side of the peninsula of which Tanjong Unsang is the northeast extremity. From Tanjong Labian, the north entrance point, the bay indents the coast westward for a distance of about 66 miles. From the west extremity of the bay, the coast trends in a general southeasterly direction for a distance of 39 miles, forming the south part of the bay.

A LIGHT is exhibited from a white framework tower located on Tanjong Labian.

The northern shore of the bay is clear of off-lying dangers, except for Howard Shoal, with a least depth of 2 1/4 fathoms, lying about 35 miles west-southwestward of Tanjong Labian, and a 4 1/2-fathom patch 6 3/4 miles farther westward. There are numerous islands and coral reefs in the western and southern parts of the bay.

Numerous rivers flow into the bay, but very few are navigable for boats beyond a short distance from their mouths.

The shores of the bay are sparsely settled but there are a few villages on the northern shore. Some of the islands in the western and southern sides of the bay are inhabited.

The northeastern entrance to Darvel Bay lies between Tanjong Labian and the Sibutu group of islands and reefs, about 16 miles southeastward, and is clear of dangers.

Vessels approaching from the southward may enter the bay through Alice Channel which separates the Sibutu group of islands and reefs, lying at the southwestern extremity of the Sulu Archipelago, from the islands and reefs lying off the coast in the southern part of the bay. The boundary between the Philippine Islands and British North Borneo passes through this channel.

A full description of the Sulu Archipelago, including the Sibutu group of islands and reefs and Sibutu Passage, will be found in H. O. Pub. No. 92, Sailing Directions for the Philippine Islands, Vol. III.

12-18 ASPECT—NORTHERN SIDE OF DARVEL BAY.—About 3 miles westward of the head of Dent Haven there appears to be a range of wooded hills from 400 to 500 feet high, but the only hill that can be identified is a wooded summit 500 feet high, 4 1/2 miles northward of Tanjong Labian.

Between Tanjong Labian and Tanjong Tungku, 23 miles west-southwestward, the land rises gradually from a low sandy coast

to a wooded ridge from 400 to 500 feet high about 1 1/2 miles inland.

Mount Bagahak (5° 03' N., 118° 46' E.), 2,740 feet high, located 7 miles west-northwestward of Tanjong Tungku, is the summit of a range on the northern shore of Darvel Bay. It falls steeply to the northward and eastward and is conspicuous from all directions, but it is frequently obscured by clouds. Mount Bagahak slopes very gradually to the southward and westward, and thence becomes a smooth-topped range with no prominent features on it.

Falling northward to quite a low watershed, the ridge rises again to a rounded apex 1,740 feet high, at a distance of 5 1/2 miles north-northeastward of Mount Bagahak, and continuing for 6 miles northeastward it then gradually diminishes in altitude, terminating in End Hill, 1,400 feet high, from which it slopes gradually down, and loses itself finally in the flat wooded country behind Tanjong Labian.

Westward of the Bagahak Range there is a considerable area of apparently flat country drained by the Sungei Silibukan. About 8 1/2 miles northward of the southern extremity of Darvel Peninsula, which lies about 23 miles westward of Tanjong Tungku, a ridge running north and south rises to a conspicuous summit, 995 feet high. Westward of this ridge and separated from it by a valley, the land gradually rises from the coast to a densely wooded and flat-topped ridge, about 600 feet high, and lying 3 miles inland; the top of this ridge forms the skyline from seaward.

12-19 NORTHERN SIDE OF DARVEL BAY—TANJONG LABIAN TO DARVEL PENINSULA.—Tanjong Labian is low and difficult to identify. A rounded point, conspicuous because of the high casuarina trees behind it, lies about 4 miles southwestward of Tanjong Labian and 7 1/2 miles farther westward is another rounded point also remarkable for its high trees, which border the coast between the two points. Close westward of the latter rounded point is the entrance to the Sungei Telok Sebahat, a small river, the mouth of which dries and is marked by nipa palms.

About 1 mile westward of the western entrance point of the river is a red cliff, 80 feet high. Midway between the red cliff and Tanjong Tungku about 10 miles west-southwestward, is the village of Tolibas which stands at the mouth of a small stream, the entrance to which is marked by small stakes.

Westward of Tanjong Tungku, which is low, the land rises to the Bagahak Range, the spurs from which slope steeply to the coast. Northward of the point there is a well-defined ridge of rolling hills, 400 to 575 feet high and lying from 1 to 2 miles inland. The Sungei Tungku, which rises 12 miles northward of Tanjong Tungku, flows through a gap in these hills and enters the bay close westward of the point. There is a depth of 1 to 2 feet on the entrance bar. A village stands on the eastern bank of the river about 3/4 mile within the entrance.

A mud flat, that dries, extends nearly 1/2 mile southward from Tanjong Tungku, and shoal water extends 1/4 mile farther, falling steeply into a depth of 14 fathoms. As this shoal does not show clearly due to the discoloration of the water by the river, vessels should keep outside of the 20-fathom curve.

A light is shown on Tanjong Tungku.

Tanjong Bagahak (Membatu), 13 1/2 miles west of Tanjong Tungku, is a low point studded with mangroves. A conspicuous spur, 520 feet high, runs down in a southerly direction to within 1 1/4 miles eastward of the point. This spur is prominent when viewed from the eastward or westward, and a summit on it, 950 feet high and about 1 mile inland, forms an easily identified landmark from those directions, but not from the southward, on account of the higher land behind it.

A LIGHT is shown on the point 1 mile northward of Tanjong Bagahak.

For a distance of 5 miles to the eastward and 2 miles to the westward of Tanjong Bagahak the coast is fringed by coral reefs that extend up to 3/4 mile offshore. Three narrow channels lead through these reefs to the shore. The edges of these reefs are steep-to.

Between Tanjong Bagahak and Shoal Point, the southeastern extremity of Darvel Peninsula, about 8 miles westward, the coast recedes slightly to the west-northwestward and forms a bight. Kennedy Bay, a small and partially examined bay, lies in the northwestern corner of this bight and appears to afford good anchorage in a depth of 10 fathoms, mud, about 2/3 mile from its head. The eastern side of the bay is formed by a reef that extends about 1/2 mile south-southwestward from Tanjong Tambak, a projecting point that lies about 5 miles west-northwestward of Tanjong Bagahak. The western side of the bay is formed by a flat, part of which dries 3 feet, that extends about 1 1/2 miles eastward

and northeastward from Shoal Point. The bay is about 3/4 mile wide at its entrance and about 1 mile in extent. The shores are fringed with reefs and several detached reefs lie in the northeastern corner of the bay close to the fringing reef.

Turner Patch, a small coral shoal with a depth of 7 fathoms, lies about 4 miles westward of Tanjong Bagahak and about 1 1/2 miles southeastward of Tanjong Tambak. Websper Patch, with a least depth of 34 feet, lies about 4 1/2 miles westward of Tanjong Bagahak. Numerous other sunken and drying reefs lie in the approaches to Everest Bay and Basilan Bay. Tambak Reef, which dries 2 feet, lies about 1/2 mile southeastward of Tanjong Tambak; it is marked on its southwestern side by a BEACON.

EVEREST BAY is a small bay that lies eastward of Kennedy Bay, and is entered between Tanjong Tambak and Tanjong Bakapit. The entrance is encumbered with shoals, some that dry at low water. Eastward of Tanjong Bakapit is Basilan Bay, a small inlet used by a lumber company for the storing of logs. A series of dolphins and a narrow pier project from the western shore for use in the logging operation.

A pier extends from the southwestern side of Tanjong Bakapit for the use of small vessels.

RANGE LIGHTS stand on the drying reef extending southward from the eastern side of Basilan Bay about 600 yards eastward of Tanjong Bakapit. These lights in range 000° lead between Brantian Reef and Ireton Patch lying about 1/2 mile south-southeastward and 1,400 yards southeastward, respectively, of Tanjong Bakapit. A red and white BEACON with a cone topmark, point down, marks the southeastern extremity of Brantian Reef. ANCHORAGE can be taken about 1 mile southward or 1 1/4 miles southwestward of Tanjong Bakapit.

It was reported (1963) that the above range lights are often secured 1 hour to 2 hours after sunset.

ANCHORAGE is prohibited to vessels carrying explosives or dangerous petroleum in the approach fairway or within 2/3 mile of the front range light. A PILOT is available and can usually be met in the vicinity of Turner Patch. No supplies can be obtained here. The lumber company maintains several small tugs for hauling logs.

Kennedy Bay may be entered by bringing the 335-foot summit, located about 2 1/2 miles north-northeastward of Shoal Point, on the northwestern side of the bay, to bear 312° and steering for it. This course will lead 1/2 mile southwestward of Turner Patch, and to the anchorage from which Shoal Point bears 235°, with the western extremity of Pulau Tabauwan, which lies about 11 1/2 miles southwestward, just open southeastward of it.

12-20 OFF-LYING DANGERS.—Howard Shoal, 2 1/2 miles southeastward of Tanjong Bagahak, is a narrow steep-to coral shoal with a least depth of 2 1/4 fathoms.

A bank, with a depth of 12 fathoms, lies about 3/4 mile southwestward of Howard Shoal.

Kinabalu Shoal, with a least depth over it of 2 2/3 fathoms, lies about 3 1/4 miles east-southeastward of Shoal Point.

12-21 TIDAL CURRENTS.—Along the northern shore of the bay the flood current sets to the westward and the ebb sets to the eastward, at a rate of about 1 knot at springs. The currents appear to turn approximately at the times of high and low water by the shore.

12-22 DARVEL PENINSULA, lying to the westward of Kennedy Bay, is low and flat, and covered by trees, 100 to 120 feet high. Tanjong Malandong, lying about 2 3/4 miles westward of Shoal Point, the southeastern point, marks the southwestern extremity of the peninsula. Deep creeks banked by mangrove trees intersect the peninsula.

The southern side of the peninsula is fronted by shallow water extending almost 1 mile southward. Depths decrease very suddenly from 10 to 3 fathoms, southeast of Shoal Point. Vessels should keep well off as the soundings give little warning.

About 2 miles north-northwestward of Tanjong Malandong lies the common entrance to the Sungei Seganen and the Sungei Silibukan, which converge at a point about 1 1/2 miles north-northeastward of the entrance. This entrance is nearly 1/2 mile wide at the mouth, and may be identified by a clump of trees, 130 feet high, on the northern part, somewhat higher than the general level of the trees in the near vicinity.

A shoal spit extends 1 1/2 miles westward from the entrance points of these rivers. The northern and western edges of this spit are very steep, falling down abruptly from 3 feet to

11 fathoms; the soundings obtained on passing it give little warning.

The deepest water over the bar is 4 feet at low water and the depths in the rivers vary with the season. The rivers are of little importance except for the fact that tobacco estates lie along their banks.

12-23 OFF-LYING DANGERS IN LAHAD DATU APPROACH—LIGHT.—Armstrong Reef, a small coral reef that dries 5 feet, with depths of 6 and 7 fathoms around it, lies 2 1/4 miles west-northwestward of Tanjong Malandong in the approach to Lahad Datu. A LIGHT is shown from a framework tower painted in black and white checkers, located on Armstrong Reef.

Crook Reef, located about 5 1/4 miles westward of Armstrong Reef, lies about 3/4 mile southward of the middle of the southern side of Pulau Sakar. A small reef lies about 2/3 mile westward of Crook Reef.

12-24 DIRECTIONS FOR CLEARING.—The summit of Pulau Adal (4° 45' N., 118° 31' E.), located in the southern part of Darvel Bay, in range with the southwest peak of Gunong Sidungal (sec. 12-47), bearing 153°, leads 2/3 mile southwestward of Armstrong Reef and 1/2 mile southwestward of the edge of the shoal spit fronting the entrance to the rivers Seganen and Silibukan. Both Pulau Adal and the southwest peak of Gunong Sidungal 8 miles south-southeastward, show as sharp, well-defined summits.

12-25 APPROACHES TO LAHAD DATU HARBOR.—Between the northwestern point of the common entrance to the rivers Seganen and Silibukan and the settlement of Lahad Datu, about 8 miles west-northwestward, the coast is fronted by detached reefs, which lie within 1 mile from the shore. From Lahad Datu for a distance of about 3 miles southward, the coast is fringed with mangroves and fronted by shoal water to a distance of over 1 mile.

PULAU SAKAR, a densely wooded and irregular shaped island, rises near the center of the southern side to a conspicuous knob, 735 feet high. It extends 5 miles in a west-southwesterly direction from its eastern extremity located about 4 miles northwestward of Armstrong Reef, and has a greatest breadth of about 2 1/3 miles in a north-northwesterly and opposite direction. It is separated from the mainland to the westward by a narrow and shallow channel.

The island has been reported (1958) to be a good radar target at a distance of 21 miles.

The SOUTHERN COAST of the island is straight and is fringed by a very narrow steep-to reef. Some small islets lie within 1/2 mile of the southwestern side of the island; the southwesternmost of these has a sharp nipple, 125 feet high, at its southeastern end.

The NORTHERN COAST of the island is much indented, narrowing the island in two places to a width of 1/2 mile. There are some islets lying close off this coast. The northeastern extremity of Pulau Sakar slopes steeply down to a low point from which a reef extends eastward for 3/4 mile. The eastern edge of this reef is marked by a BEACON. The edge of this reef is not always distinguishable and vessels should round this reef with extreme caution.

12-26 A CHANNEL, 1 1/4 miles wide with depths of 15 to 21 fathoms, lies between this reef and the detached reefs off the coast to the northeastward. This channel leads into the protected waters of Lahad Datu Harbor.

HALLORAN REEF, lying about 1/3 mile off the center of the northern part of the island, and about 1 1/2 miles west-northwestward of the northeastern point of the island, is a small coral reef that dries 5 feet; shoal water extends for a short distance off its northeastern side. A wooden BEACON, with a red and white vertically divided cylindrical topmark and marked No. 8, stands on the northeast side of this shoal water.

12-27 DIRECTIONS.—The summit of Pulau Adal in range with the southwestern peak of Gunong Sedongal, bearing 153°, just clears the edge of the reef off the northeastern extremity of Pulau Sakar, and Pulau Adal must be brought slightly to the southwestward of this peak before rounding the reef.

The northeastern extremity of Pulau Sakar in range with Tanjong Malandong, bearing 124°, leads about 1/4 mile northeastward of Halloran Reef.

12-28 LAHAD DATU HARBOR.—The harbor of Lahad Datu lies to the northward of Pulau Sakar and is protected to the westward and northward by the sharply indented coast. The settlement of Lahad Datu lies on the northwestern shore of the bay almost 4 1/2 miles northwestward of the northeastern extremity of Pulau Sakar.

A LIGHT is shown from the head of the pier at Lahad Datu.

A MOORING BUOY is located about 200 yards south-southeastward of the head of the pier.

The depths shoal gradually from between 15 and 21 fathoms at the entrance to 5 fathoms at the anchorage, which is located about 1/4 mile southeastward of the pierhead.

12-29 REEFS AND DANGERS—BEACONS.—Voorwyk Reefs consist of a chain of four small reefs extending from 1/2 to 1 1/2 miles southeastward from the head of the pier at Lahad Datu. These reefs dry 2 feet and are fairly steep-to, with a depth of 7 fathoms close-to, but shoal water extends for a short distance southward of the southeasternmost reef.

The two northern reefs, named "Gosungan," are marked at their northeastern extremity by a tripod beacon with a red and white vertically divided cylindrical topmark, No. 18. The west extremity of these reefs is marked by a tripod beacon with red and white vertically divided cylindrical topmark, No. 9.

The center and largest reef, named "Voorwyk," is marked at its eastern extremity by a tripod BEACON with a red and white vertically divided cylindrical topmark, No. 16, at its west extremity by a BEACON with a red and white vertically divided cylindrical topmark, No. 7, and at its south extremity by a BEACON with a red and white vertically divided cylindrical topmark, No. 5.

The southern reef, named "Tinggeri," is marked at its eastern extremity by a tripod BEACON with a red and white vertically divided cylindrical topmark, No. 14, and at its west extremity by a tripod BEACON with a red and white vertically divided cylindrical topmark, No. 3.

A coral patch, named "Bershesherk," with a depth of 4 feet, lies midway between Gosungan Reefs and the shore northward of it. This small patch is surrounded by depths of 6 fathoms and is marked on its southern side by a BEACON with a black conical topmark, No. 11.

A BEACON with a black conical topmark, No. 13, marks the edge of the coastal reef on the north shore and is located about 2/3 mile eastward of the pierhead at Lahad Datu.

Gray Reef is a small coral reef 800 yards southward of the pierhead, with a least depth of 3 fathoms close to its eastern edge. Another small reef lies about 700 yards southward of Gray Reef. These reefs lie on the east edge of the shoal water on the west

side of the harbor. Gray Reef is marked by two beacons.

12-30 Channels.—The southern and main channel, with a least depth of 5 fathoms at the anchorage about 1/4 mile southeastward of the pierhead, leads between Gray Reef and Voorwyk Reefs. Beacons Nos. 3, 5, 7, and 9 mark the northeastern side of this channel and beacons 10 and 12 mark the western side.

The northern channel lies to the northward of Voorwyk Reefs and passes between them and the coastal reef to the northeastward. Vessels using this channel should pass north-eastward of beacons 14, 16, and 18 and southward of beacons 11 and 13, to the anchorage. Depths in this channel range from 9 fathoms to 5 fathoms at the anchorage. This channel is generally used by outgoing vessels.

There are deep channels between Tinggeri and Voorwyk, and between Voorwyk and Gosungan.

The boat channel leading westward of Pulau Sakar from Darvel Bay is less than 200 yards in places and has depths of 2 to 4 feet. Small craft with local knowledge can use this unmarked channel at high water. A rock, that dries nearly 3 feet, lies in the fairway about 3/4 mile within the southern entrance.

12-31 Anchorage.—Anchorage may be obtained between Gray Reef and the northernmost Voorwyk Reef in 5 fathoms, mud. The pierhead bearing 327°, and a conical hill 580 feet high, located 3 miles west-southwestward of it, bearing 255°, can be used for anchor bearings.

Anchorage is afforded northward of Pulau Sakar in 7 to 14 fathoms, good holding ground.

Anchorage is prohibited to vessels carrying explosives or dangerous petroleum in the approach fairway or within 2/3 mile of the head of the pier.

12-32 Directions.—After passing about 1/4 mile northeastward of Halloran Reef (see directions for approaches to Lahad Datu Harbor, sec. 12-27), vessels should steer 295° until the pierhead at Lahad Datu bears 327°, then they should steer for it on that bearing, which course will lead clear of dangers to the anchorage between the northernmost Voorwyk Reef and Gray Reef.

12-33 Tides.—The mean high-water in-

terval at Lahad Datu is 5h. 28m. and the spring range is 5 3/4 feet.

12-34 Tidal currents.—The water at Lahad Datu is generally stationary, but intermittently there is a very slight east-going current.

12-35 LAHAD DATU (05° 01' N., 118° 19' E.) is a small settlement lying in the northwestern portion of the bay formed by the coast north of Pulau Sakar. The settlement owes its importance to the fact that it is the headquarters of the District Office and also of the Darvel Bay Tobacco Co. The chief exports are tobacco, rubber, timber, and copra. A small railroad runs from the port to the plantations nearby.

In 1956 the population of the town was about 4,000.

Berth.—A wooden wharf, located at the end of a 966-foot-long embankment, is 80 feet long and 55 feet wide. The least depth along-side is 9 feet. Only coastal vessels may berth.

Supplies.—Vegetables and bread may be obtained. Water is supplied to the village, but it is not laid onto the pier. This water must be boiled before using.

Communication.—There is steamer communication with Sandakan and other ports in the State of North Borneo.

An airline provides service in North Borneo and links all the main settlements.

Lahad Datu is connected by telegraph and telephone with Sandakan, but both are unreliable.

12-36 SILAM HARBOR.—Silam Harbor lies in the northwest part of Darvel Bay between the west end of Pulau Sakar and Tanjong Tumunong Hallu, 6 3/4 miles west-southwestward. Two detached reefs lie 1/2 mile southeastward and eastward, and reefs and foul ground lie within 1 mile west-southwestward of the southwestern extremity of Pulau Sakar. A chain of detached reefs extends southwestward from the western side of the foul ground for about 3 3/4 miles, terminating in Adams Reef. This chain encumbers the eastern approach to Silam, located on the northwestern shore of the harbor and 6 1/4 miles westward of the southwestern extremity of Pulau Sakar.

Several channels lead through this chain of reefs but the main channel over 3/4 mile wide leads between Pulau Katung Kalungan

(Kalung Kalungan) and Misanmisan Reef in the middle of the chain.

A boat channel marked by stakes leads to the old pier at Silam village.

The shores are irregular and fronted with reefs and dangers within almost 1 mile of the coast. Many islands and reefs lie in the harbor. Pulau Baik, near the middle of the harbor, and the Saddle Islands southwestward of it protect the anchorage off Silam. The depths in the harbor are very irregular and vary from over 20 fathoms at the entrances to about 10 fathoms at the anchorage.

12-37 Aspect.—Mt. Silam, a flat-topped wooded mountain, 2,920 feet high, lies about 2 1/2 miles westward of Silam pier and is conspicuous as the highest mountain in that vicinity. It stands up boldly, being separated by a deep valley from the other mountains westward and southward of it, and slopes steeply to the northeastward. The ridge rises again to Mt. Mark and continues to the eastward as a coastal range with a gradually diminishing altitude.

Mt. Mark, with a well-defined summit, 1,530 feet high, lies about 1 1/2 miles northwestward of Silam pier and about 2 miles northeastward of Mt. Silam. It is easily identified as it is the first summit showing on the skyline northeastward of Mt. Silam and has a long spur extending down toward Silam.

Tanjong Tumunong Hallu, the southern point of Silam Harbor, is the eastern extremity of a low range of coastal hills and is conspicuous.

12-38 Islands and dangers.—Pulau Katung Kalungan (Kalung Kalungan), a small islet with a round top 145 feet high, lies about 3 miles west-southwestward of the southwestern extremity of Pulau Sakar. It stands on a reef that projects about 150 yards from this islet. A light is shown from the southeastern side of Pulau Katung Kalungan.

Misanmisan Reef, awash and sometimes difficult to see, lies about 5/6 mile north-northeastward of Pulau Katung Kalungan. A reef, awash at low water, lies about 1/2 mile east-northeastward of Misanmisan Reef and from its reefs and foul ground extend east-northeastward 1 2/3 miles to the southwestern extremity of Pulau Sakar.

Pulau Baik (Babi), near the middle of Silam Harbor, extends 1/2 mile west-northwestward from its eastern extremity located

about 1 1/3 miles north-northwestward of Pulau Katung Kalungan and has a greatest width of about 1/4 mile in a north-northeasterly and opposite direction. The island is thickly wooded and has a conspicuous conical summit 374 feet high near its eastern end. From the western point of the island a narrow tongue of reefs projects for about 2/5 mile in a northwesterly direction. White Rocks, near the end of this reef, show their heads 1 foot above high water. Vessels loading timber at Silam Harbor may anchor westward of Pulau Baik.

A light is shown from the northwest extremity of the reef extending northwest from Pulau Baik.

The northeastern extremity of Pulau Baik is fringed by a reef that projects about 250 yards northward. A narrow detached reef, separated from the fringing reef by a narrow and deep channel, lies over 250 yards northward of this fringing reef and extends about 400 yards in a northerly direction.

Woodhall Reefs are two detached coral reefs, which dry 1 foot, lying about 1/2 mile from the northern shore of the harbor, and located about 2/3 mile northward of Pulau Baik. A deep channel, with a least width of 1/4 mile, lies between the southern side of Woodhall Reefs and the narrow detached reef northward of Pulau Baik.

The southwestern extremity of Pulau Baik in range with Mt. Mark, bearing 299°, leads southwestward of Misanmisan Reef.

The northeastern extremity of Pulau Baik in range with Mt. Mark, bearing 296°, leads between Misanmisan Reef and the reefs eastward of it.

Wise Hill, 460 feet high, located about 1 mile northeastward of Silam pier, in range with Mt. Mark, bearing 290°, leads between Woodhall Reefs and the narrow detached reef northward of Pulau Baik.

Gusong Dilaut, a narrow reef 600 yards long east and west, and awash at low water, lies 2/5 mile westward of Pulau Katung Kalungan, with a clear passage about 600 yards wide between them.

The eastern extremity of Pulau Baik in range with Kissing Hill, 540 feet high, and located on the northern shore about 1 3/4 miles northward of Pulau Baik, bearing 356°, leads between Gusong Dilaut and Pulau Katung Kalungan.

Wanderer Reef, awash at high water and lying to the south-southwestward of Gusong

Dilaut, extends almost 1/2 mile south-southwestward from a position about 3/4 mile southwestward of Pulau Katung Kalungan and has a greatest width of about 400 yards, east and west.

Adams Reef, a small reef awash at low water and lying west-southwestward of Wanderer Reef, is located about 1 3/4 miles southwestward of Pulau Katung Kalungan (Kalung Kalungan). A small sandbank that dries 2 feet lies at its eastern extremity.

The Saddle Islands are a chain of six wooded islands extending in a northwesterly direction for a distance of about 2 1/4 miles from a position about 1 1/2 miles westward of Pulau Katung Kalungan. The westernmost island of this chain lies about 1 mile southward of Silam and about 1/2 mile southeastward of the shore at the head of the harbor.

Gifford (Giffard) Islet, 120 feet high, the easternmost island of the chain, lies 1 1/2 miles westward of Katung Kalungan and is fringed by a reef that extends 200 yards eastward from it. From the northwestern side of Gifford Islet the reef extends about 1/4 mile west-northwestward to the southern side of Pulau Tabauwan. A small islet, 60 feet high, lies midway between Gifford Islet and Pulau Tabauwan.

Pulau Tabauwan extends about 3/5 mile northward from its southern side and has a greatest width of about 1/4 mile. A 305-foot summit is located near its center and a 175-foot hill is located near its northern extremity. Powers Spit, a coral ledge with depths of less than 3 fathoms, extends north-northwestward from the northern extremity of the island for a distance of about 1/3 mile. The western extremity of the island is connected to the southeastern extremity of Pulau Sumabun, located 1/2 mile west-northwestward, by a reef. Pulau Nipanipa, a small islet 200 feet high, lies on this reef about midway between the two islands.

Pulau Sumabun, 280 feet high, extends about 1/2 mile in a northwesterly direction from its southeastern extremity and has a greatest width of about 1/4 mile.

Pulau Sagai, 195 feet high, the westernmost island of this chain, lies about 1/4 mile westward of Pulau Sumabun. It stands on a

reef that is separated by a very narrow passage from the reef fringing the western side of Pulau Sumabun.

The western extremity of Pulau Sumabun in range with Mt. Mark, bearing 330°, leads southwestward of Adams Reef.

The eastern extremity of Gifford Islet in range with the northwestern point of Pulau Baik, bearing 024°, leads westward of Adams Reef.

Pulau Saranga, lying close off Tanjong Tumunong Hallu, extends about 1/2 mile southward from its northern extremity located about 2/3 mile southwestward of Pulau Sagai. The island consists of two wooded hills joined by a narrow strip of mangroves; the northern hill is 171 feet high and the southern 250 feet high. The island is fringed by a reef that projects southward from its southern side almost 1/4 mile. The passage to the westward between the island and Tanjong Tumunong Hallu is encumbered by reefs.

A small detached reef lies about 1/3 mile eastward of the eastern extremity of Pulau Saranga.

The western extremity of Pulau Sagai in range with Mt. Mark, bearing 338°, leads eastward of this detached reef.

Kiddle Reefs consist of two narrow reefs with shallow water between them. The reefs extend west-northwestward 2/3 mile from a position located about 1 1/2 miles south-southeastward of the southern extremity of Pulau Saranga. Foul ground extends southward from the southern side of the eastern reef for a distance of about 250 yards, and a 4-fathom patch lies about 300 yards northward of it. A 6-fathom patch lies close off the eastern side of the eastern reef.

Mt. Mark, bearing 347°, open eastward of Pulau Saranga, leads eastward of the Kiddle Reefs.

12-39 Tidal currents.—The tidal currents off Silam Harbor are very weak and appear to turn approximately at high and low water by the shore.

12-40 Northern and western shore of Silam Harbor.—From the southwestern entrance point of the boat channel to Lahad Datu, the coast trends westward for 3 1/4 miles to the

northeastern entrance point of Soai Soaiun Bay and then trends northwestward for almost 1 mile forming the eastern side of this bay. The entrance with depths of 7 and 8 fathoms lies between the northeastern entrance point and a point 1/3 mile westward of it. The western side of the bay is very irregular and has two shallow finger-like arms at its head. Reefs and foul ground extend about 1/2 mile southward from the western entrance point.

A 2 2/3-fathom patch was reported (1963) to lie in the entrance of Soai Soaiun Bay.

From the western entrance point to Soai Soaiun Bay, the coast trends in a general southwesterly direction for about 4 miles to Tanjong Tumunong Hallu, the southern point of Silam Harbor. The coast between these two points is indented and irregular and reefs and foul ground front it a distance of about 1 mile. The settlement of Silam is located in this stretch about 2 miles north-northeastward of Tanjong Tumunong Hallu.

12-41 Anchorage.—The anchorage lies about 1/2 mile southeastward of the pier at Silam in a depth of about 9 fathoms, sand and coral. This anchorage should be used only by small and medium sized vessels as it lies on very uneven bottom and is encumbered to the southward and eastward by three coral heads with 3 fathoms over them and by Holmes Rock, with a least depth of 15 feet, lying 1/2 mile northward of the northern extremity of Pulau Sumabun. Good anchor bearings are formed by the northern extremity of Pulau Baik in range with the south extremity of the southernmost islet, 125 feet high, off the southwest end of Pulau Sakar, bearing 095°, and the west extremity of Pulau Sagai in range with the eastern extremity of the southern part of Pulau Saranga, bearing 199°.

Larger vessels should anchor outside these patches, lying on the irregular shore reef fronting Silam, in a depth of 15 or 16 fathoms.

A good anchorage may be obtained in 18 to 20 fathoms close northward of the reef extending northwestward from Pulau Baik and westward of Woodhall Reefs.

A sheltered anchorage may be obtained, in a depth of 8 to 10 fathoms, mud, in the bight on the northern side of Tanjong Tumunong Hallu, with the northern extremity of that point bearing 154°, distant 1/2 mile.

12-42 Directions.—The anchorage off Silam may be approached by passing either northward or southward of the Saddle Islands. The approach from the eastward passing northward of Saddle Islands is clear of dangers after passing in between Pulau Katung Kalungan and Misanmisan Reef, but Power Spit must be given a wide berth. The passage from the southward, between Pulau Sagai and Pulau Saranga and thence between Pulau Sagai and the coast, is clear but narrow.

Vessels approaching Silam from the eastward should pass at least 2 miles off Darvel Peninsula and then steer for Pulau Katung Kalungan. After passing about 1/3 mile northward of Pulau Katung Kalungan, vessels should then steer for Mt. Mark, bearing 305°, until the northern extremity of Pulau Baik is in range with the south extremity of the southernmost islet, 125 feet high, lying off the southwest end of Pulau Sakar, bearing 095°; vessels should then keep this range dead astern until the western extremity of Pulau Sagai is in range with the eastern extremity of the southern part of Pulau Saranga, bearing 199°, at which point they should anchor. This range clears Holmes Rock by about 250 yards and leads to the inner anchorage for small and medium-sized vessels.

Vessels approaching Silam from the southward should pass about 1 mile southwestward of Adams Reef, bringing the western extremity of Pulau Sagai in range with Mt. Mark, bearing 338°, and steering for it. This course leads about 1/4 mile eastward of the small detached reef lying off Pulau Saranga. Vessels should then round Pulau Sagai at a distance of 200 to 400 yards, after which they should bring the western extremity of Pulau Sagai in range with the summit of the southern hill on Pulau Saranga, bearing 205°; they then should steer with this range dead astern up to the anchorage, passing between the two westernmost 4-fathom patches.

12-43 HEAD OF DARVEL BAY—Tanjong Tumunong Hallu to Tanjong Batai.—The coast trends southwestward from Tanjong Tumunong Hallu 3 1/2 miles to Tanjong Bang Kuruan, which marks the northern entrance point to Lamak Bay, and may be identified by a conspicuous small (continued on page 281)

wooded knoll, 260 feet high near its extremity, and by the conspicuous Stewart Peaks, 1,510 and 1,610 feet high, lying $3\frac{3}{4}$ and $4\frac{1}{2}$ miles, respectively, west-northwestward of it. This part of the coast is fronted by many small detached reefs extending about $2\frac{1}{2}$ miles offshore. Some small detached reefs lie within $\frac{1}{2}$ mile southeastward of Tanjong Bang Kuruan.

12-44 Lamak Bay, entered between Tanjong Bang Kuruan and Tanjong Batai, lying about $2\frac{1}{2}$ miles southward, penetrates the coast about 2 miles to the westward and affords anchorage in from 5 to 8 fathoms, mud. The southern and western sides of the bay are shallow, the 3-fathom curve extending upwards of 1 mile offshore in places, but there are greater depths in the northern side of the bay. The shore line of the bay is bordered by an extensive mud flat. Several small rivers, named Diwata, Magul, Sabahan, and Ladong, flow into the bay. None of these rivers is sufficiently broad or deep to allow boats to ascend them for any considerable distance, and they cannot be entered at all except at high water.

Tanjong Batai, the southern point of Lamak Bay, is a low mangrove point, from which a spit of sand and mud, that dries, extends about $\frac{3}{4}$ mile north-northeastward. The outer edge of this spit is steep-to. The Sungei Tingkayu, a small river too shallow to admit boats, flows out close southward of the point.

12-45 Off-lying dangers.—The Moorhen Reefs consist of four small reefs which extend about $\frac{3}{4}$ mile northeastward from a position about $2\frac{1}{4}$ miles northeastward of Tanjong Batai.

The summit of Tanjong Bang Kuruan in range with the western Stewart Peak, bearing 301° , leads southwestward of Moorhen Reefs.

The summit of Pulau Baik, bearing 38° , well open southeastward of Giffard Islet, leads close southeastward of these reefs.

12-46 SOUTHERN SIDE OF DARVEL BAY (*H. O. Charts 2116 and 2117*).—From the eastern extremity of the mainland on the southern side of the bay ($4^\circ 26.5' N.$, $118^\circ 38.5' E.$), the

coast trends in a general northwesterly direction for a distance of about 40 miles to Tanjong Batai, the southern entrance point to Lamak Bay. Many islands, reefs and dangers lie off the coast in the southern part of Darvel Bay and the coast is very irregular.

Dangers extend about 20 miles eastward and east-northeastward from the eastern extremity of the mainland, and Alice Channel, which lies between these dangers and the reefs of the Sulu Archipelago, $6\frac{1}{2}$ miles northeastward, affords a clear and deep passage between Darvel Bay and Sibuku Bay to the southward. The boundary between British North Borneo and the Philippine Islands passes through this channel.

12-47 Aspect.—Gunong Sigalong (Mt. Sinalong), 2,060 feet high and conical in shape, lies 13 miles westward of the easternmost point of the mainland on the southern side of the bay. It is one of the most conspicuous mountains in this vicinity as it falls steeply down to the plain to the eastward and westward of it.

Mt. Tanna Ballu, with a conical peak 2,035 feet high, located about 12 miles northward of Gunong Sigalong, lies near the center of Pulau Timbun Mata, a large mountainous island lying close off the coast. Gunong Sidungal (Mt. Sidongal), a conical mountain, 1,605 feet high, lies on the eastern extremity of this island about $7\frac{1}{2}$ miles east-southeastward of Mt. Tanna Ballu.

Several peaks, 840 to 1,540 feet high and densely wooded, lie on Pulau Gaya and Pulau Bohidulong, which are located from 11 to 14 miles northeastward of the eastern extremity of the mainland. These peaks form a good landmark for vessels approaching Darvel Bay from the southward via Alice Channel.

Other conspicuous marks are Mt. Hewitt, 1,355 feet high, about 11 miles northwestward of Gunong Sigalong; Cook Hill, 705 feet high, $4\frac{1}{3}$ miles northward of Mt. Hewitt; Wyatt Hill, 410 feet high, $4\frac{1}{3}$ miles north-northwestward of Cook Hill and close to the coast; and Mt. Mostyn, 1,625 feet high, $10\frac{1}{4}$ miles northwestward of Mt. Hewitt.

Gunong Madai (Mt. Madai), 3 1/2 miles northward of Mt. Mostyn, and 4 1/2 miles from the coast, is 1,560 feet high, and is very conspicuous. It is formed of limestone with bare cliffs, which show white in places. There are some low trees on the summit and the slopes are densely wooded. The mountain appears as a perfect cone from the eastward. It appears as a sharp peak standing on shoulders of nearly equal height, when viewed from the northward.

Mt. Skertchley, lying 5 1/2 miles northwestward of Gunong Madai and 6 1/2 miles inland from Tanjong Batai, is a broad flat-topped mountain, 1,530 feet high.

Mt. Beeston, located 10 1/2 miles north-northwestward of Mt. Skertchley, is a wooded peak 2,830 feet high. A long spur extends in an east-southeasterly direction from it for a distance of 9 1/2 miles down to the coast on the northern side of Lamak Bay. About midway along this spur lie the two Stewart Peaks, nearly 3/4 mile apart, the western being 1,610 feet, and the eastern 1,510 feet high. From these peaks two ridges are thrown off; one trending for a long distance west-southwestward, and the other curving around to the southward, forms an amphitheatre in which the Sungei Diwata rises.

12-48 Alice Channel.—Alice Channel, the southern entrance to Darvel Bay, is a deep passage over 6 miles wide at its narrowest part. It connects Darvel Bay with Sibuku Bay and separates the islands and reefs lying off the coast from the islands and reefs lying in the western extremity of the Sulu Archipelago.

Pulau Bohayan (Boheian) ($4^{\circ}28.5'N.$, $118^{\circ}56'E.$), 120 feet high and densely wooded, lies on the southern side of an elongated reef that extends 7 miles northward from its southern extremity, which is located 18 miles eastward of the easternmost point of the mainland. This reef, which has a greatest width of about 2 miles, forms the western side of the entrance to Alice Channel. Pulau Timba Timba, a small wooded islet, 33 feet high, lies near the northern extremity of this reef and has a sandbank, that dries 3 feet, connected to its

southern side and extending almost 1/2 mile southward from it.

Pulau Kapale (Pandanan), 90 feet high, and wooded, lies on the southwestern side of a reef that extends about 1 mile northward from its southern extremity, which is located about 1 mile northward of Pulau Timba Timba. A shallow spit connects this reef with the northern extremity of the reef on which Pulau Timba Timba lies. A sand spit, that dries 3 feet and has some bushes on its northern extremity, extends about 1/4 mile northward of Pulau Kapale on this reef.

A shoal patch, with a least depth of 6 1/4 fathoms, coral and sand, lies on the eastern side of Alice Channel about 8 1/4 miles east-northeastward of Pulau Bohayan.

Pulau Matakang and Pulau Matakang Kechil lie on the western side of a narrow and steep-to reef that extends 2 1/2 miles northward from a point located about 2 miles east-northeastward of the southern extremity of Pulau Timba Timba.

A light is shown on Pulau Matakang. The eastern side of this reef forms the western side of Alice Channel and a deep channel 1/4 mile wide lies between this reef and the reefs on which Pulau Timba Timba and Pulau Kapale lie. Pulau Matakang is 130 feet high and wooded. Pulau Matakang Kechil, 45 feet high, lies about 1/2 mile northward of Pulau Matakang, and is connected to it by a narrow sand ridge, that dries 3 feet. Shoal water extends 1/4 mile westward of this sand ridge, outside the reef.

Bajapa Reef, which marks the eastern side of Alice Channel, extends north-northeastward 9 miles from a position located about 6 3/4 miles eastward of Pulau Matakang Kechil, and has a greatest width of about 2 1/2 miles in a northwesterly and opposite direction. This reef dries in patches and encloses a lagoon in the center, the entrance to which is on the southwestern side. The reef is steep-to on all sides except at the northern end, where shoal water extends off for a short distance. Alice Channel has its least width of 6 1/4 miles between the southern extremity of this reef and the reef on which Pulau Matakang and Pulau Matakang Kechil lie.

Panguan Islet, 60 feet high and wooded, lies on the southern end of a narrow steep-to reef. This reef, which lies to the northwestward of Bajapa Reef, extends almost 1 mile northward from a position located about $8\frac{3}{4}$ miles north-eastward of Pulau Mataking Kechil. A shoal, with a least depth of 5 fathoms, extends about 400 yards northward and the same distance south-westward of this reef.

Alice Reef, lying to the eastward of Panguan Islet and to the northwestward of Bajapa Reef, extends $5\frac{1}{2}$ miles north-northeastward from its southern extremity located about $1\frac{1}{2}$ miles east-southeastward of Panguan Islet, and has an extreme width of $1\frac{3}{4}$ miles. It is steep-to except off the northeastern point, from which point the 5-fathom curve lies at a distance of over $\frac{1}{2}$ mile. On the western side, about $2\frac{3}{4}$ miles from the southern extremity of the reef, is the entrance to a lagoon. Alice Reef bares in spots at low water.

A deep channel $1\frac{1}{2}$ miles wide separates Alice Reef from Bajapa Reef and another deep channel 1 mile wide separates Alice Reef from Panguan Islet.

Pulau Pom Pom, a small circular islet with a summit near the center 180 feet high to the tops of the trees, lies on the western side of Alice Channel, 3 miles west-northwestward of Pulau Kapale, and is surrounded by a narrow steep-to reef.

A reef, on which there is a sandbank, that dries 3 feet, extends almost 2 miles northward from its southern extremity, located about $2\frac{1}{2}$ miles northwestward of Pulau Pom Pom. This reef is steep-to, except off its southern side, from which a shoal, with depths of less than 5 fathoms, extends about $\frac{1}{2}$ mile southward. The reef has an extreme width of about 1 mile.

Pulau Mantabuan, a small bell-shaped islet about 100 feet high, is located $4\frac{1}{2}$ miles west-northwestward of Pulau Pom Pom. This islet lies on the southern side of a triangular-shaped reef that extends $1\frac{1}{2}$ miles north-northwestward, 1 mile north-northeastward and $\frac{1}{4}$ mile southward from it. This reef encloses a lagoon.

Freemantle Shoal, a shoal area with a least depth of 8 fathoms, extends $1\frac{3}{4}$ miles north-

ward from a position $5\frac{1}{2}$ miles northward of Pulau Mantabuan, and has a greatest width of 1 mile, within the 20-fathom curve. This shoal area is steep-to on all sides.

Richards Reef, lying 1 mile west-southwestward of Freemantle Shoal, consists of a number of reefs the outer edges of which are awash at low water. These reefs extend $1\frac{1}{2}$ miles north-northwestward, $2\frac{1}{2}$ miles east-northeastward, and $2\frac{1}{2}$ miles north-northeastward from their southwestern extremity located about $6\frac{1}{2}$ miles northwestward of Pulau Mantabuan. The reefs are steep-to except on the northwestern and north-eastern sides.

12-49 Tidal currents.—In Alice Channel the flood current sets southward and westward, and the ebb northward and eastward, at a maximum rate of 2 to $2\frac{1}{2}$ knots.

In the vicinity of Panguan Islet and Bajapa Reef the current runs strongly and sets straight through the steep-to edges of Alice and Bajapa Reef.

12-50 Pulau Bum Bum (*H. O. Chart 2117*), presenting no prominent features, is a large triangular-shaped island, flat and densely wooded, 150 to 170 feet high to the tree tops. The island extends over 7 miles in an east-northeasterly direction, and about $5\frac{1}{4}$ miles in a north-northwesterly direction, from its southwestern extremity located about $1\frac{3}{4}$ miles southward of the easternmost point of the mainland.

Tanjong Pantau Pantau, the eastern extremity of the island, is fronted by a reef that extends $1\frac{1}{2}$ miles eastward from it; shoal water fronts this reef to a distance of $\frac{1}{2}$ mile.

The western side of the island is known as Kubong, and is separated from the eastern extremity of the mainland by a narrow winding channel, named Trusan Tando Bulong, which is described in sec. 12-78. The coastline is composed of low cliffs of upraised coral.

Mangroves fringe the northern and eastern coasts of the island. On the north coast, which stretches in a west-northwesterly direction for 8 miles from Tanjong Pantau Pantau, there is a fringing reef of sand and coral, that dries in patches,

and extends from 1 1/2 to 2 miles from the northern side of the island. Several low islets lie on this fringing reef.

There are several villages on the north coast and two on the southeastern side of the island, about 1 and 1 1/2 miles, respectively, from Tanjong Pantau Pantau.

12-51 Islands and dangers eastward and northward of Pulau Bum Bum.—Pasalat Reef, awash, lies near the center of an elongated shoal that extends 3 1/4 miles in a west-northwesterly direction from its eastern extremity located about 2 3/4 miles northward of Tanjong Pantau Pantau. The shoal has a greatest width of 3/4 mile within the 10-fathom curve and is separated from the northern edge of the fringing reef on the northern side of Pulau Bum Bum by a deep channel 3/4 mile wide.

Bulipatuid Reef, with a least known depth of 4 1/2 fathoms, lies east-southeastward of Pasalat Reef and is separated from it by a deep channel about 1 mile wide. Bulipatuid Reef extends 1 1/2 miles northwestward from its southeastern extremity which lies 2 3/4 miles northeastward of Tanjong Pantau Pantau, and has a greatest width of 3/4 mile within the 10-fathom curve. A deep channel about 1 mile wide separates it from the shoal water fronting the fringing reef off the northeastern side of Pulau Bum Bum. Vessels should not attempt to cross over this shoal, as it is possible that there is less depth than charted.

Baturua Reef, lying to the northeastward of Bulipatuid Shoal, dries from 1 to 2 feet in patches, and extends 4 miles north-northwestward from a point located 5 1/2 miles east-northeastward of Tanjong Pantau Pantau; it has a greatest width of 2 miles east and west, within the 10-fathom curve. A deep channel about 1 3/4 miles wide separates it from Bulipatuid Reef.

Pulau Kulapuan, a flat-topped, wooded island, 130 feet high, lies 7 miles northeastward of Tanjong Pantau Pantau, and near the northern end of a reef that extends about 2 1/2 miles south-southeastward from the island. This reef, with a greatest width of 1 1/2 miles, uncovers in patches

from 1 to 2 feet. A small sand cay, drying 2 feet, lies near the southern end of the reef. The reef is steep-to on all sides, except at its southern end, from which depths of less than 10 fathoms extend about 3/4 mile.

A deep channel 1/2 mile wide separates this reef from Baturua Reef lying to the westward. Another deep channel separates the eastern side of this reef from the reef which encloses Pulau Timba Timba and Pulau Bohayan. This channel is about 2 1/2 miles wide.

Pulau Gaya and Pulau Bohidulong, two high, densely wooded islands standing on the same reef, and almost united, are the most conspicuous landmarks seen on approaching Darvel Bay from the southward; together they form a crescent 4 miles across. These islands together with Pulau Timbun Matu, which lies close off the coast and 8 miles to the westward, are visible from the northern part of Sibuku Bay over the low islands southward of them.

Pulau Bohidulong, located about 8 miles northward of Tanjong Pantau Pantau, forms the eastern horn of the crescent, and has a conspicuous peak, 1,200 feet high, near its southern extremity. The island has a length of about 1 1/2 miles north and south, and a greatest width of 3/4 mile.

Pulau Gaya, with its easternmost extremity lying close to the northward of Pulau Bohidulong, extends 2 1/4 miles west-northwestward from its eastern extremity and then curves to the southwestward for 2 1/4 miles, forming the western side of the crescent. The southwestern part of Pulau Gaya rises to a peak, 1,540 feet high, with two slightly lower peaks close to it, presenting remarkable outlines, especially when seen from the northward and eastward. The eastern part of Pulau Gaya culminates in a conspicuous peak, 1,240 feet high. The land between the eastern and western parts of the island being low causes Pulau Gaya to appear as two islands from some directions. The reef around Pulau Gaya extends nearly 1 1/4 miles northwestward of the northwestern side of the island and encloses a lagoon full of shoal patches, between it and the island.

Pulau Tatagan, 320 feet high and partly cleared at its summit, lies close southward of the southwestern point of Pulau Gaya. There is a village at the northern side of the island.

Detached reefs and foul ground extend $2\frac{1}{4}$ miles southwestward from the southern side of Pulau Bohidulong, and thence $2\frac{1}{2}$ miles northward, forming a protected lagoon between them and the crescent formed by Pulau Gaya and Pulau Bohidulong. There is fairly clear space in the middle of this lagoon with depths of 7 to 16 fathoms. The entrance to the lagoon lies southward of Pulau Tatagan and is less than 200 yards wide, with a depth of $3\frac{1}{2}$ fathoms. There are no marks for entering and only vessels with local knowledge should attempt it. These vessels may obtain anchorage, in a depth of about 10 fathoms, sand, eastward of the village located on the northern side of Pulau Tatagan.

A clear channel about $2\frac{3}{4}$ miles wide leads between the above detached reefs and Baturua Reef lying to the southeastward.

The channel, between the northeastern side of the reef on which Pulau Bohidulong and Pulau Gaya lie, and the reef that encloses Pulau Mantabuan is about 1 mile wide but its entrance is encumbered by a shoal, with a least depth of $4\frac{1}{2}$ fathoms, coral, that lies 1 mile northeastward of the eastern extremity of Pulau Bohidulong.

Pulau Sabangkat, a small island 160 feet high to the tree tops, lies near the southwestern extremity of a vast boot-shaped reef that extends 5 miles north-northwestward and $3\frac{3}{4}$ miles eastward from its southwestern extremity located 4 miles north-northeastward of the northwestern extremity of Pulau Bum Bum. The reef has a greatest width of $1\frac{3}{4}$ miles, north and south, at its toe and $2\frac{1}{2}$ miles, east and west, near its center. This reef encloses a lagoon full of shoal patches. Two rocks, ~~sc~~ about 5 feet high, lie on the inner side of the reef about $1\frac{1}{2}$ miles northward of Pulau Sabangkat.

Pulau Salakan, 240 feet high, and wooded, lies about $1\frac{1}{2}$ miles southwestward of Pulau Tatagan and about $1\frac{3}{4}$ miles east-northeastward of the toe of the boot-shaped reef.

Pulau Maiga, a small islet 125 feet high, lies on the southwestern edge of a detached reef that extends $1\frac{1}{2}$ miles northward from its southern extremity located about $1\frac{1}{2}$ miles north-northwestward of Pulau Salakan; the reef has a greatest width of about $\frac{3}{4}$ mile, east and west.

A deep channel $\frac{3}{4}$ mile wide lies to the eastward of the reefs surrounding Pulau Maiga and Pulau Salakan, and passes between them and the reefs surrounding Pulau Gaya.

Pulau Sibuan is a small wooded islet on the southwestern side of a reef that extends about 1 mile north-northeastward from a position located about 3 miles northwestward of Pulau Maiga. A deep channel $\frac{3}{4}$ mile wide separates the southern side of this reef from the northern side of the boot-shaped reef on which the Salakan and Sabangkat islets lie.

Church Reef, awash, extends $1\frac{1}{2}$ miles north-northeastward from a position $1\frac{1}{4}$ miles northwestward of Pulau Sibuan, and has a greatest width of 1 mile, east and west. A deep channel $\frac{3}{4}$ mile wide separates it from the reef on which Pulau Sibuan lies.

12-52 Tidal currents.—The tidal currents run very strongly around and between these islands and reefs. Generally speaking the ebb runs to the northward and eastward and the flood to the southward and westward at a rate of 1 to $1\frac{1}{4}$ knots.

12-53 Directions.—The northeastern extremity of Pulau Sabangkat in range with Mt. Tanna Ballu ($4^{\circ}40' N.$, $118^{\circ}27.4' E.$), on Pulau Timbun Mata, bearing 297° , leads northeastward of Bulipatuid Shoal and Pasalat Reef and between them and Baturua Reef.

12-54 Pulau Timbun Mata, densely wooded and mountainous, extends $16\frac{1}{4}$ miles westward from Tanjong Sedungal, its eastern extremity, located about $8\frac{1}{4}$ miles north-northwestward of the northwestern extremity of Pulau Bum Bum, and has an extreme width of about $5\frac{3}{4}$ miles. It rises from a low western point to Mt. Tanna Ballu near its center, a sharp conical peak, 2,035 feet high and conspicuous. At the eastern ex-

tremity of the island, Gunong Sedungal, a conical mountain, 1,605 feet high, is also conspicuous.

The northern side of the island is very irregular and is fronted by reefs and dangers. The southern side of the island is separated from the mainland by a shoal boat passage called Trusan Sigalong.

The shore reef projects $\frac{1}{3}$ mile eastward of Tanjong Sedungal and thence curves around in convex form to Tanjong Timbun Mata, which lies $3\frac{1}{4}$ miles southwestward of Tanjong Sedungal. Two low islets, 65 and 75 feet high, lie near the southwestern side of this shore reef.

12-55 Islands and dangers lying between the southeastern part of Pulau Timbun Mata and the mainland.—Pulau Silawa extends $4\frac{1}{2}$ miles east-northeastward from its western extremity located about $3\frac{3}{4}$ miles south-southwestward of Tanjong Timbun Mata, and has a greatest width of about 1 mile. The island is flat-topped and wooded, with a conspicuous hill, 360 feet high, at its southwestern end. A reef extends from $\frac{1}{2}$ to 1 mile from the northern end, leaving a channel $\frac{3}{4}$ mile wide between it and the fringing reef eastward of Tanjong Timbun Mata, the southeastern point of Pulau Timbun Mata. The channel between Pulau Silawa and the mainland is $\frac{1}{2}$ mile wide, and between Pulau Silawa and another island westward of it nearly 1 mile wide, with a least depth of $3\frac{1}{2}$ fathoms in the fairway. Depths of less than 3 fathoms extend 600 to 1,600 yards off this last island; to keep in the greatest depths the southwestern point of Pulau Silawa should be rounded at a distance of about 400 yards.

A shoal, with a least depth of $3\frac{1}{4}$ fathoms, lies in the entrance to the channel between Pulau Silawa and the shore reef fronting the southeastern side of Pulau Timbun Mata.

Vessels should pass to the southward of the above shoal, which is located $2\frac{1}{2}$ miles east-northeastward of Tanjong Timbun Mata. The southeastern extremity of an islet, 70 feet high, located about $\frac{3}{4}$ mile southwestward of Tanjong Timbun Mata, in range with the southeastern extremity of a wooded island, $2\frac{1}{4}$ miles west-southwestward, bearing 252° , leads southward of

this shoal and through the fairway into Trusan Sigalong.

A rock, with a depth of 3 feet, lies about $\frac{1}{2}$ mile southwestward of the southwestern extremity of Pulau Silawa.

Pulau Larapan, a small island 1 mile in extent, 200 feet high to the top of the trees, lies nearly 1 mile eastward of Pulau Silawa, but the navigable channel between them is only $\frac{1}{4}$ mile wide. The edges of the reef on both sides of the channel are irregular and broken. A village lies on the western side of this island.

A deep channel, 2 miles wide, passes to the eastward of Pulau Larapan and Tanjong Sedungal, between them and the western side of the boot shaped reef on which the Sabangkat and Salakan islets lie.

12-56 Trusan Sigalong—Dangers.—Trusan Sigalong, a narrow and tortuous channel, separates Pulau Timbun Mata from the mainland. It has a least width of $\frac{2}{3}$ mile and is only navigable by small craft with local knowledge. A mud bank, with a depth of $1\frac{1}{2}$ fathoms, extends across the channel near its midpoint.

Tanjong Timbun Mata is formed by a spur that extends southward from the mountains on the eastern side of Pulau Timban Mata. Near the water's edge the point is fringed with trees. Depths of less than 3 fathoms extend $\frac{1}{4}$ mile southward from the point. Westward of Tanjong Timbun Mata the coast of the island forms a bay, which is much encumbered by reefs.

A long narrow reef fronts this bay and extends $2\frac{1}{2}$ miles west-northwestward from a position about $\frac{1}{2}$ mile southwestward of Tanjong Timbun Mata. A 70-foot islet lies on the eastern extremity of this reef and an 85-foot islet lies near the center of the reef.

Two wooded islets, 235 and 385 feet high, lie 2 miles and $3\frac{1}{2}$ miles, respectively, north-northwestward of the southwestern extremity of Pulau Silawa.

The entrance channel to Trusan Sigalong passes southward of the long reef and thence between the two islets, at which point it shoals rapidly to a least depth of $1\frac{1}{2}$ fathoms.

The Sungei Sigalong flows into the southeastern part of Trusan Sigalong about 3 1/2 miles southwestward of Pulau Silawa. It rises in the mountains and flows nearly north, draining the country east of Gunong Sigalong. The river is broad and deep within the entrance, with depths of 4 fathoms for some distance, but its mouth is fronted by a mud flat with depths of 3 to 4 feet. The banks of the river are bordered by nipa palms and small boats have ascended it for a distance of 5 or 6 miles, finding it free from obstructions and other dangers.

Pyramid Hill is a conspicuous pyramidal-shaped hill, 1,050 feet high, standing close to the coast about midway along the southern shore of Trusan Sigalong. It is the northernmost peak of an isolated range of hills occupying the peninsula eastward of the Sungei Sipit.

The Sungei Sipit flows into the southern side of Trusan Sigalong just to the westward of Pyramid Hill. The entrance is fronted by a broad flat, over which for a distance of 2 miles the depth is only about 2 feet at low water, deepening within to 3 and 4 fathoms. Several arms flow into this river but all are narrow and navigable only by small boats.

12-57 Anchorage.—A vessel has anchored in a depth of 12 fathoms, with Tanjong Timbun Mata bearing 267°, distance 1/2 mile.

A vessel might anchor out of the current in a depth of 6 or 7 fathoms, with the southern extremity of Tanjong Timbun Mata bearing 79°, distance 1/2 mile, by passing between the shoal water off the point and the reef fringing the 70-foot islet 3/4 mile southwestward. This anchorage has not been closely examined.

12-58 Tidal current.—The tidal current, through the eastern entrance to Trusan Sigalong, runs northeastward at a rate of 3/4 knot during ebb and southwestward at a rate of 1 knot during flood tide.

12-59 NORTHERN SIDE OF PULAU TIMBUN MATA.—Between Tanjong Sedungal and the northern point of the island, about 8 3/4 miles west-northwestward, the north coast is deeply indented by reef-fringed bays which are encumbered with reefs and dangers. As the approaches to these bays are foul, vessels should not approach this coast within the

20-fathom curve which extends up to about 3 miles from it.

Pulau Balusuan, a small islet 60 feet high, lies about 1 1/2 miles from the north coast, and 4 miles northwestward of Tanjong Sedungal. Patches of foul ground and reef extend up to 2/3 mile northward and eastward of the islet, and thence in a southeasterly direction for about 3 3/4 miles towards Tanjong Sedungal. A 10-fathom patch lies about 1 mile northward of the islet.

A larger island, 250 feet high, lies southward of Pulau Balusuan and close to the coast.

Vessels should not pass southward of Pulau Balusuan as the north coast of Timbun Mata is fronted with dangers up to about 1 1/2 miles.

Pulau Batik Laut (Batik), 795 feet high, is separated from the north point of Pulau Timbun Mata by a channel 400 yards wide with a depth of 3 1/2-fathoms in the middle. The island is nearly 2 miles in length east and west, and 1 1/4 miles wide.

Pulau Batik (Batik Kulambu), 805 feet high, and densely wooded, extends 2 3/4 miles westward from its eastern extremity located close off the northwestern coast of Pulau Timbun Mata. A narrow and foul channel separates its southeastern side from Pulau Timbun Mata. The coast of the island is reef-fringed and bordered with mangrove. This reef extends about 1/4 mile northwestward of the western extremity of the island.

Between the southern side of Pulau Batik, which has two indentations, and the northern side of the western end of Pulau Timbun Mata, a bay is formed at the head of which vessels may obtain anchorage in a depth of 13 fathoms.

This bay, 2 1/4 miles wide at its entrance, extends 3 1/4 miles eastward to its head, and is clear of dangers except on its southern side. Hamby Reef, drying 3 feet lies nearly in the middle of the entrance of this bay. A rock, 6 feet high, lies close to the eastward of the northern part of this reef. Vessels entering this bay should pass in between this rock and the southwestern extremity of Pulau Batik about 1 mile to the northeastward.

Southward of Hamby Reef and about 1/2 mile from the coast of Pulau Timbun Mata, there is an islet, 210 feet high to the top of the trees. Reefs and dangers lie in the southern

part of the bay up to about 3/4 mile northward of the northern side of the western end of Pulau Timbun Mata.

12-60 Islands and dangers northward and northwestward of Pulau Timbun Mata.—Pulau Adal (4° 45' N., 118° 31' E.), is a conspicuous, conical, wooded island, 360 feet high, located 2 3/4 miles northeastward of the eastern extremity of Pulau Batik Laut. It is fringed by a narrow reef, and a sand spit, that dries about 7 feet, extends 1/4 mile southwestward of its south point. A 6 1/2 fathom depth was reported (1965) to lie about 1 mile north-northeast of the north extremity of the island. An 8 fathom depth (1965) lies about 1 3/4 miles south-southeast of the southwest extremity of Pulau Adal.

Bakuhang, Bankauhang, and Gatahand are three small islets lying on reefs that are nearly joined. These islets extend west-northwestward 1 1/2 miles from a position located about 1 1/2 miles west-northwestward of Pulau Adal. Bakuhang, 285 feet high, is the easternmost and largest of these islets. Bankauhang, 155 feet high, is the center islet. Gatahang, the westernmost and smallest of the group, is 68 feet high, with a lone tree on its summit, and has a reef extending almost 1/2 mile west-northwestward from it.

A deep channel 1 1/4 miles wide separates these islets from Pulau Adal. Another deep channel 2 miles wide lies between Bakuhang Islet and the northern side of Pulau Batik Laut.

Pulau Tabauwan, the largest and easternmost of a group of thickly wooded islands lying in the southwestern part of Darvel Bay, extends almost 4 miles west-northwestward from its eastern extremity located about 4 1/2 miles northwestward of the northern extremity of Pulau Batik Laut, and has a greatest width of 1 1/2 miles, north and south. Being higher than the other islands of the group and lying well offshore, it may be easily identified when approaching from the eastward. Two peaks lie near the middle of the island, the western of which is 905 feet high, and shows sharply from all directions, and the eastern, 910 feet high. There is very little fringing reef, except near the southeastern end of the island, where a tongue of reef extends over 400 yards southward.

Near the middle, on the southern side of Pulau Tabauwan, a bay, about 700 yards wide at its entrance, is formed between two promontories extending south-southwestward

from the slopes of the two peaks. There are depths of 13 to 20 fathoms in the center of this small bay, which extends about 1 mile north-northeastward from its entrance points. The head of the bay is foul for nearly 1/4 mile offshore.

Pulau Silumpat, 550 feet high, and wooded, extends 1 1/2 miles south-southeastward from its northern side located about 400 yards southward of the eastern entrance point of the bay on the southern side of Pulau Tabauwan. It has a greatest width of 2/3 mile east and west, and is nearly divided into two parts, being only connected by a narrow neck of land near the northern end.

Learmonth Reef, nearly awash and marked on its northwest side by a beacon, lies 2 miles southeastward of Pulau Silumpat, and about midway between that island and Pulau Batik Laut to the southeastward.

Pudsey Reefs are two small reefs, about 1 1/2 miles apart, north and south. The northern reef lies 2 miles westward and the southern reef lies 2 miles southwestward of the western extremity of Pulau Silumpat.

Dawson Rock, with a depth of 1 fathom, is a small pinnacle rock lying to the westward of Pudsey Reefs and located almost 3 miles west-southwestward of the western extremity of Pulau Silumpat.

Pulau Bohihan (Bohayan), the timber-loading site for the port of Lahad Datu (sec. 12-28), is a small triangular-shaped island, 780 feet high, lying about 2 miles west of Pulau Tabauwan. Pulau Palundangan (Malundungan), 295 feet high to the tops of the trees, lies about 400 yards south of Pulau Bohihan and is separated from it by a narrow passage encumbered with reefs; these reefs show discoloration when the sun is high. Pulau Tanah (Tanna), 395 feet high, lies about 3/4 mile southwest of the southwest end of Pulau Bohihan. A long narrow reef lies in the passage between Pulau Bohihan and Pulau Tanah, and a 4 3/4-fathom patch lies close off the northwest end of Pulau Bohihan.

Pulau Majinkil, 430 feet high, is a narrow island that extends about 2/3 mile west-southwestward from its eastern point located about 1/2 mile southward of Pulau Palundangan. Two small islets, 90 and 33 feet high, lie close southward and westward, respectively, of Pulau Majinkil.

The offices of this loading site are located at the southwest end of Pulau Bohihan. Customs officials board vessels at the anchorage. Vessels loading timber use the

anchorage between Pulau Tanah and Pulau Palundangan during the northeast monsoon, and west of Pulau Bohihan during the south-east monsoon; vessels anchor in 22 to 27 fathoms in the former anchorage.

NAVIGATIONAL AIDS.—Beacons mark the northwest end of Pulau Bohihan, the north and south ends of Pulau Palundangan, the north end of Pulau Majinkil, the north end of Pulau Tanah, and the north and south end of the narrow reef between Pulau Bohihan and Pulau Tanah.

Range beacons, in line 326°, stand on the southwest end of Pulau Bohihan, and yellow range beacons stand close east-northeast of the same point. These ranges indicate the anchorages.

ENTRANCE.—There are three passages leading into the south anchorage; the eastern leads east of Pulau Bohihan and then between Pulau Palundangan and Pulau Majinkil; the western leads west of Pulau Bohihan and then between the southwest end of Pulau Bohihan and the narrow reef southwestward; the third passage leads south of Pulau Tanah.

Pulau Maganting, the westernmost island of this group, lies about 1 mile west-northwestward of Pulau Bohihan. The island has a hill, 385 feet high near its western side and a hill, 370 feet high, near its center with a slight depression between. A small reef awash at low water, lies about 600 yards southward of the island.

Little Reef, awash, extends about 800 yards northeastward from a position located about 1 3/4 miles north-northwestward of the northwestern side of Pulau Maganting.

A chain of small coral reefs, that nearly dry, lie between the above islands and the coast, and extend northwestward for about 7 1/4 miles from a position about 3 miles westward of Pulau Batik. Deep channels pass in between these reefs.

Walton Reef, the southeasternmost of this chain, lies 3 miles westward of Pulau Batik. McKinlay Reef, marked by a BEACON, lies 1 3/4 miles westward of Walton Reef, and about 3 1/4 miles south-southeast of Pulau Majinkil. Rashleigh Reef, marked by a BEACON, lies 2 1/4 miles northwest of McKinlay Reef, and about 2 1/2 miles south-southwest of Pulau Majinkil. Reefs and shoals extend about 3/4 mile east from Rashleigh Reef. A black and white checkered beacon with a cone topmark, point up, stands at the east end

of these reefs. Normanhurst Reef lies about 1 3/4 miles northeast of Rashleigh Reef, and about 1 mile south of the west end of Pulau Majinkil. Sheppard Reef lies 1 1/5 miles westward of Normanhurst Reef, and about 1 1/2 miles west-southwest of Pulau Majinkil. Lawler Reef, the northwesternmost of the chain, lies 2 miles northwestward of Sheppard Reef, and about 2 1/4 miles west-southwestward of the northwestern extremity of Pulau Tanah.

The western extremities of Pulau Tanah and Pulau Maganting in range, bearing 343°, lead very close west of Normanhurst Reef, and east of Sheppard and Rashleigh Reefs.

Nichols Reef, a small coral patch nearly awash, lies to the north-northwestward of this chain, and is located about 2 1/5 miles west-southwestward of the northwestern extremity of Pulau Maganting.

CAUTION.—Mariners are urged to use great caution when navigating south and westward of 4° 50' N., and 118° 26' E., as many uncharted dangers and reefs exist.

12-61 COAST AND COASTAL DANGERS—TRUSAN SIGALONG TO TANJONG BATAI.—From the western entrance point of Trusan Sigalong, which lies 1 mile westward of the western extremity of Pulau Timbun Mata, the coast trends northwestward for about 7 miles to the mouth of the Sungei Madai. The coastline is irregular and bordered with mangrove. Reefs and foul ground front the coast to a distance of 3/4 mile and several off-lying reefs lie off this stretch of the coast.

Merrett Reefs lie at the north end of a line of reefs and shoals extending about 2 1/2 miles north from the west entrance point of Trusan Sigalong. Detached shoals with depths of 2 1/4 to 3 3/4 fathoms lie within 1,700 yards east and 850 yards north, respectively, of the north end of Merrett Reefs. A detached patch with depths of 5 to 7 feet lies close east of Merrett Reefs about 1 3/4 miles north of the west entrance point of Trusan Sigalong.

A 3 3/4-fathom patch and a 2 3/4-fathom patch lie in the approach to the west entrance of Trusan Sigalong in positions about 1 1/4 miles and 1/2 mile, respectively, north-northeast of the west entrance point of this passage.

A BEACON stands on the coastal reef close north of the west entrance point of Trusan Sigalong. Another BEACON marks the south end of a reef about 1/2 mile farther north-northwestward.

Greep Reefs, several in number, lie from about 1 mile to 2 1/4 miles offshore, about 4 3/4 miles northwest of the west extremity of Pulau Timbun Mata. The northwest and south ends of Greep Reefs are each marked by a red and white checkered beacon with a can topmark.

Lloyd Reefs, about 3/4 mile southeast of Greep Reefs, consist of two groups of reefs and shoals about 150 yards apart. A black and white checkered BEACON with a cone topmark, point up, marks the southernmost of Lloyd Reefs.

Numerous reefs and dangers, some of which are marked by BEACONS, lie between Merrett and Lloyd Reefs and the coast.

Mostyn, a village, stands on the coast about 3 1/2 miles northwest of the west entrance point of Trusan Sigalong. There is a small pier at Mostyn.

A light is shown about 1 1/5 miles east by south of Mostyn.

The Sungei Madai leads to the Birds' Nest caves, and is navigable by boats for a distance of about 1 1/2 miles. A small mangrove islet lies 3/4 mile eastward of the entrance, at the end of a spit of mud and sand that dries. A broad tongue of reef extends 3/4 mile northward from the islet. The entrance of the river lies between this reef and the coastal reef. A depth of 3 to 4 feet is found at the mouth of the river, with 2 or 3 fathoms depth within.

Pulau Tagabua, a small wooded islet, 67 feet high, lies 2 miles off the coast, and is located about 2 1/4 miles north-northeastward of the mangrove islet lying eastward of the entrance of the Sungei Madai. Foul ground and detached reefs lie within about 1/2 mile west-northwestward, 1 mile southeastward, and 1 1/4 miles southwestward of Pulau Tagabua. The passage between this islet and the coast is foul.

Anchorage may be obtained, in 9 fathoms, mud, with Pulau Tagabua bearing 047°, distant 1 1/4 miles.

Between the mouth of the Sungei Madai and Tanjong Batai, 7 miles north-northwestward, there are two salt-water creeks. A ridge of coastal hills, from 285 to 395 feet high, runs

parallel to the coast for 2 miles from the northern entrance point to the Sungei Madai. This ridge assists in identifying the river entrance. Tanjong Batai, the southern entrance point of Lamak Bay, and Lamak Bay are described in sec. 12-44.

12-62 SIBUKU BAY.—Sibuku Bay comprises that part of the east coast of Borneo between the east extremity of Pulau Bum Bum and Poelau Mandoel, 71 miles southwestward. The area surrounding the northern and northwestern part of the bay is British Territory, but Poelau Mandoel and the area lying about 22 miles northward of it belongs to Indonesia. The bay covers a vast area and there are many channels leading through its reef-strewn waters. A great many rivers flow into this bay, but most of them are fronted by mud banks and can be navigated only by small boats.

12-63 ASPECT.—The mountain system on the northern side of Sibuku Bay centers in Mt. Magdalena (4° 30' N., 117° 55' E.), 4,420 feet high, and densely wooded. It presents a sharp peak from all sides.

From Mt. Magdalena a high range of peaks, forming a backbone, extends in a south-southeasterly direction for 15 miles, terminating in Chinaga Timor, 1,390 feet high, immediately to the north-northwest of Batu Tinagat (4° 13' N., 117° 59' E.). On this backbone there are several very conspicuous peaks, notably Mt. Lucia, 4,070 feet high, Maria Peak, 3,680 feet, Mt. Andrassy, 2,200 feet, and Mt. Putri, 1,020 feet high, which lies on a spur of this range about 1 mile southward of Chinaga Timor, and close off the coast. The range gradually diminishes in elevation from Chinaga Timor to the coast.

A secondary watershed branching at right angles from the main backbone springs from Mt. Lucia, which lies 2 miles south-southeastward of Mt. Magdalena. This secondary system curving around to the eastward, and lower in altitude, eventually terminates in Mt. Wullerstorf, 13 1/2 miles east-southeastward of Mt. Magdalena; while to the westward it forms a high ridge, which curves to the southward and terminates in Mt. Kukusan, 730 feet high, close to the coast about 8 miles west-northwestward of Batu Tinagat and 1 3/4 miles northward of Tawau. On this ridge there are three other conspicuous elevations.