The first of these elevations, distant 3 1/2 miles southwestward of Mt. Lucia, is a high saddle with two conspicuous peaks, 2,670 and 2,640 feet high. The next is Table Mountain, 1,980 feet high, perfectly flat-topped, and located about midway between Mt. Magdalena and Mt. Kukusan. A spur extends in a northwesterly direction from Table Mountain for about 3¾ miles terminating in a prominent peak, Tiger Hill, 1,550 feet high. The third elevation is Mt. Gemok, a large flat-topped summit, 1,405 feet high, located 2 miles northward of Mt. Kukusan.

Lesser watersheds also branch away from Mt. Magdalena in northwesterly and northeasterly directions.

Mt. Wullerstorf, 2,500 feet high, with a conical summit, is one of the most conspicuous peaks on the northern side of Sibuku Bay. It slopes steeply on its eastern side to the plains below, but a range of mountains from 2,115 to 1,680 feet high (the latter elevation being a conspicuous sharp cone 5 1/4 miles from Mt. Wullerstorf) stretches north-northwestward from it. A densely wooded valley 7 miles wide lies between this range and the low spurs of the mountains eastward of it. The Sungei Kalampang rises in this valley.

The principal landmarks on the northern side of Sibuku Bay may be readily identified. The summits of the highest peaks, such as Mts. Magdalena and Lucia, and Maria Peak, are often obscured by clouds, but those of lower elevations are usually visible.

Quoin Hill (*4°25′ N., 118°01′ E.*), 1,965 feet high , lies 4 1/4 miles east-southeastward of Maria Peak, and stands up conspicuously in the plain eastward of the main backbone running southward from Mt. Magdalena.

Immediately northward of Batu Tinagat there is a range of hills, which reach a highest elevation of 1,390 feet. The northern slopes of these hills are steep, and they appear isolated from the eastward. Gunong Batu Chinaga, the northernmost and highest of this range, lies about 2 miles north-northwestward of Batu Tinagat. Mt. Andrassy, a rounded summit on the main backbone mentioned above, is the first prominent mountain peak northward of these hills.

Mt. Putri, 1,020 feet high, is a spur of the Batu Tinagat range, and lies close to the coast, about 1 mile northwestward of Batu Tinagat.

Mt. Kukusan, 730 feet high, close to the coast about 8 miles west-northwestward of Batu Tinagat, is a very conspicuous pyramidal-shaped hill, and is quite unmistakable.

12–64 Northern entrances to Sibuku Bay—South coast of Pulau Bum Bum.—From Tanjong Pantau Pantau, the eastern extremity of Pulau Bum Bum, the south coast of the island trends west-southwestward for 7 miles to the southwestern point, forming in the center a wide indentation about 1 mile deep. A bay, with depths of 1 to 2 fathoms, and with many coral patches, lies in this indenture. These coral patches dry at low water. A reef extends 1 1/2 miles eastward and 3/4 mile southward from Tanjong Pantau Pantau and up to about 1/2 mile from the coast westward.

Beaufort Reef, of sand and coral, and drying in patches, lies southward of the eastern part of Pulau Bum Bum. This reef extends almost 6 miles south-southwestward from a point located about 1 1/4 miles southward of the eastern extremity of the reef fronting Tanjong Pantau Pantau, and has a greatest width of about 4 miles, east and west. It is separated on its northern side from the fringing reef of Pulau Bum Bum by a channel about 2/3 mile wide. Pulau Omadel, low and wooded, 150 feet high to the tree tops, lies on the northeastern end of this reef. There is a village on the northwestern side of this islet, close westward of which there is an opening in the reef which affords access to canoes.

Three shoals lie off the northeastern side of Beaufort Reef. The northernmost, with a least depth of 3 fathoms, lies 2 miles eastward of the eastern extremity of Pulau Omadel. The southernmost, with a least depth of 3 1/2 fathoms, lies 1 3/4 miles southeastward of the same point. A 5-fathom patch lies close to the northward of the latter shoal.

Creagh Reef is an extensive flat of sand and coral, that dries in patches. It extends about 5 1/2 miles southward and 7 1/2 miles southwestward from the southwestern point of Pulau Bum Bum.

On its western edge there are three thickly wooded islets. Pulau Menampilik, 345 feet high, lies close to the southwestern edge of this reef about 6 miles southwestward of the southwestern point of Pulau Bum Bum. Pulau Nusatongga, with two hills 415 and 365 feet high, lies 1 mile northeastward of the above islet, and Pulau Sipanggau, 390 feet high, lies almost 1/2 mile northeastward of Pulau Nusatongga.

A wooded islet, 80 feet high, lies near the center of the reef about 1 3/4 miles south-southeastward of the southwestern point of Pulau Bum Bum.

It is barely possible for boats to cross this reef at high water.

12–65 Silapag Passage.—This narrow curving passage, with a least depth of 8 fathoms, lies between Beaufort Reef on the east and Pulau Bum Bum and Creagh Reef on the north and west, respectively. The channel trends west-southwestward for 4 miles between the northern side of Beaufort Reef and the southern side of the fringing reef on the southern side of Pulau Bum Bum, with a breadth of 2/3 mile, and then turns to the southward for 4 miles between Beaufort and Creagh Reefs where it contracts to a width of about 1/4 mile.

12–66 Tidal currents.—The flood current sets to the southward and westward and the ebb current to the northward and eastward through this passage. The current runs at a considerable rate during springs.

12–67 Anchorage.—A vessel has anchored in the northern part of Silapag Passage about 300 yards northward of the village on Pulau Omadel, but this anchorage is not recommended as the tides run strongly and the channel is very narrow.

12–68 Dangers in northeastern approach to Ligitan Channel.—Webb Shoal, lying off the northeastern approach to Ligitan Channel, and 6 1/2 miles eastward of Pulau Omadel, has a least depth of 5 fathoms. Vessels should not pass over it as there may be less depth than charted.

A 6-fathom patch lies 4 1/4 miles south-southeastward of Pulau Omadel near the entrance to Ligitan Channel.

12–69 Dangers marking southern side of Ligitan Channel—Ligitan Group.—The Ligitan Group is a group of islets and reefs lying off the north coast of Sibuku Bay, extending over a distance of 18 miles east and west, and separated from Beaufort and Creagh Reefs to the northward by Ligitan Channel. The easternmost islet of this group is Pulau Si Amil, which lies 7 1/2 miles east-southeastward of the southeastern extremity of Beaufort Reef, and 8 3/4 miles southeastward of Pulau Omadel. The westernmost islet of this group is Pulau Mabul lying 15 miles west-southwestward of Pulau Si Amil, and about 4 miles southward of the southern side of Creagh Reef.

Pulau Si Amil, the northeasternmost island of the Ligitan Group is densely wooded. On its western side there is a sandy spit, and off the northwestern point a reef extends for 400 yards, leaving a deep passage 400 yards wide between the reefs of Pulau Si Amil and Pulau Danawan to the southwestward. There is a canning factory on the island.

A light is shown from a white steel framework tower located on the summit of Pulau Si Amil.

A black and white **beacon,** surmounted by a white diamond, stands on the northwestern edge of the reef extending from the northwestern point of Pulau Si Amil.

The eastern side of a vast reef is formed by a line that extends 6 1/2 miles south-southeastward and then 5 3/4 miles south-southwestward from its northern extremity located about 2/3 mile west-northwestward of Pulau Si Amil; from its southeastern point the reef extends 8 1/2 miles west-northwestward to its southwestern extremity, and is somewhat indented. The western side of the reef lies between the southwestern point and the northern point about 10 3/4 miles northeastward, and is somewhat irregular. Shallow water extends 1/2 mile from the eastern side of this reef, on which the sea breaks heavily, and along which there are tide-rips and heavy overfalls. Vessels should not approach too closely to the edge of this reef as the water is somewhat discolored and the edge of the reef has not been closely examined. The southern part of this reef dries 1 to 2 feet.

Pulau Danawan lies near the northern end of this reef and Pulau Ligitan near its southeastern extremity.

A 2 3/4-fathom patch lies 1/2 mile southward of the southeastern extremity of the reef.

12–70 Pulau Danawan (*4°18.5′ N., 118°51.5′ E.*), 90 feet high, stands on the northern part of the main reef, and lies about 1/2 mile southwestward of Pulau Si Amil. The eastern point of this islet is a cliff, 55 feet high, and the northern point is the same height. On the western side of the island there is a village. The island is only accessible to boats on the eastern side, where the reef closely approaches the coast. A bay lies between the reefs on the eastern side of Pulau Danawan and the narrow fringing reef on the western side of Pulau Si Amil. The bay has a width of about 1/2 mile and is quite deep, having depths of about 26 fathoms in its center.

(4548) **BORNEO—East coast—Ligitan Group—Less water reported.**—Considerably less water has been reported (1966) in the vicinity of (approx.) 4°14.5′ N., 118°56.2′ E.

(W.P. 670, 1966.) (N.M. **28/66.**)

H.O. Charts **2117, 3044.**

H.O. Pub. 71, 1951, page **292.**

Pulau Ligitan, 8 1/2 miles southward of Pulau Danawan and lying on the same reef, lies about 1 3/4 miles northward of the southern extremity of the vast reef. The islet is 30 feet high and has some bushes on it. A light is shown from Pulau Ligitan. A narrow sandbank, that dries 4 feet, extends almost 1/2 mile northward and 400 yards southward from the islet. A sandbank, that dries 3 feet, lies about 2 3/4 miles northward of Pulau Ligitan.

Off the southern end of the main reef the tidal currents run at a rate of 2 to 3 knots, causing heavy overfalls and whirls. Great care should be exercised in approaching the southeastern end of the reef, especially as the marks for fixing the position are distant.

Foul ground and shallow water, in the form of a tongue 1 mile wide, north and south, extend westward for 2 1/2 miles from the southwestern extremity of the main reef. The sea does not generally break over the edge, which is steep-to, and therefore it should be given a wide berth.

Cust Reef, awash, lies on the southern side of the fairway of Ligitan Channel, and 7 1/2 miles westward of Pulau Danawan. Several small detached reefs lie about 1/4 mile off the northern side of this reef. Ligitan Channel passes northward of these reefs, between them and the southern side of Beaufort Reef lying about 2 3/4 miles northward. Vessels should keep well clear of these detached reefs by passing outside the 10-fathom curve surrounding them.

Southeastward of Cust Reef, and separated from it by a narrow channel, is a larger reef, 2 1/2 miles long, east and west, and about 1 mile in average breadth. The edge of this reef has not been closely examined, but it appears to be foul to a distance of 1/2 mile on all sides. The channel eastward of this reef, between it and a projecting spur of the main reef, is 2 miles wide, but although no detached patches were actually found in it, yet the survey of this portion of the group was of too general a character to justify vessels venturing in this channel or the other passages between the reefs.

Pulau Kapalai, a small narrow sand islet with some bushes on it, 40 feet high, lies on the northeastern side of a detached reef that extends 2 miles northwestward from a position located about 12 1/2 miles west-southwestward of Pulau Si Amil. The reef has a greatest width of about 1 mile, northeast and southwest. A sandbank, that dries 3 feet, extends 1/3 mile southward from the southeastern end of the islet and about 400 yards westward from its western side. Shoals with depths of less than 6 fathoms extend 1 1/2 miles northwestward from the western extremity of the reef and about 1/2 mile eastward of the southeastern extremity of the reef on which Pulau Kapalai lies.

The passage between the reef on which Pulau Kapalai lies and the foul ground off the southwestern point of the main reef is 1 1/4 miles wide, but is obstructed in the middle by a 5-fathom patch. Other patches with less depths may be found as this area has not been closely examined.

Pulau Mabul, a small and densely wooded islet, 160 feet high to the tree tops, lies on the northern side of Mabul Reef, which extends 1 1/4 miles north-northwestward from its southern point located about 3 miles west-northwestward of Pulau Kapalai, and has a greatest width of 3/4 mile, east and west. This islet is the westernmost of the Ligitan Group.

The passage between Mabul Reef and the reef on which Pulau Kapalai lies is 2 miles wide, with depths of 4 to 5 fathoms on either side, and 6 1/2 fathoms in a narrow channel about 1/4 mile wide, and about one-third of the distance across from the Mabul side. No depth less than 4 fathoms was found on either side of the passage except close to the reefs, but the examination was not sufficiently exhaustive to determine that there is not a less depth, and therefore vessels should use Mabul Passage on the western side of Mabul Reef in preference to it.

12-71 Mahul Passage and approaches.—Mabul Passage, westward of Mabul Reef, is the channel between the Ligitan Group to the eastward and Ligitan Reefs to the westward. It is 3 1/2 miles wide, but is obstructed in the middle by a bank with 3 1/4 fathoms on it; on the eastern side of the passage there is another bank with a depth of 4 1/2 fathoms. The deepest part of the passage, which is a little over 1/2 mile wide, lies between these two banks, and carries a depth of 7 to 8 fathoms right through.

Collins Patch, about 1/1/2 miles northwestward of Pulau Mabul, has a depth of 2 3/4 fathoms, and lies at the southern end of a bank of sand and coral extending within depths of 10 fathoms for a distance of about 1 1/2 miles northward and northwestward. Another coral patch, with a depth of

4 3/4 fathoms, lies 3/4 mile northwestward of Pulau Mabul. The banks on which these two patches lie are about 200 yards apart with a depth of 12 to 13 fathoms between them. Vessels should not cross these banks as the depths over them are uneven, and it is possible that other shallow patches may exist.

A 5-fathom patch lies about 1/2 mile northward of the eastern extremity of Pulau Mabul and two 6-fathom patches lie, respectively, 1/4 mile west-northwestward and 1/2 mile eastward of the 5-fathom patch.

12–72 Directions for clearing Mabul Passage.—Mount Sidongal (on the eastern extremity of Pulau Timbun Mata) (see sec. 12–54) in range with the western extremity of Pulau Sipanggau, which lies on the western side of Creagh Reef, bearing 356°, leads to the westward of Collins Patch and through Mabul Passage.

12–73 Pulau Gusungan, located on the northern side of the western entrance to Ligitan Channel, is a small sand cay, 3 feet high, with a few low bushes on it. It lies on the northwestern extremity of a drying reef, that extends 1 mile south-southeastward from a position about 1 3/4 miles southwestward of Pulau Menampilik, and has a width of about 1/2 mile, northeast and southwest.

12–74 Ligitan Channel, between the Ligitan Group on the south and Beaufort and Creagh Reefs on the north, is 18 miles in length in a west by south and opposite direction, and varies in width from 6 miles abreast of Pulau Si Amil to 1 1/2 miles at its western entrance, between Pulau Gusungan and the projecting horn of the easternmost Ligitan Reef.

The general depths in the eastern part are from 11 to 14 fathoms, with patches of 6 to 10 fathoms. Farther to the westward there are depths of 18 to 20 fathoms, shoaling again to 9 and 12 fathoms at the western entrance. Except for **Collins Patch,** with a least depth of 2 3/4 fathoms, no dangers have been discovered in the channel except close to the edges of the reefs. The depths, however, are very uneven northward and northwestward of Pulau Mabul up to a distance of about 2 1/2 miles. Vessels should keep to the northward of this uneven ground when passing Pulau Mabul.

12–75 Tidal currents.—In Ligitan Channel the flood current runs to the southward and westward and the ebb current to the northward and eastward, at a strength of 1 knot at springs.

12–76 Anchorage.—Anchorage may be obtained in a depth of 16 fathoms in a bay on the eastern side of Pulau Danawan, 300 yards offshore, protected to the eastward by Pulau Si Amil.

12–77 Outlying island.—Pulau Sipadan (*4°07′ N., 118°38′ E.*), located 7 1/2 miles southward of Pulau Mabul, is a small wooded islet, 165 feet high to the tops of the trees, standing on the northwestern side of a steep-to reef that extends 1/3 mile north-northeastward and 1/2 mile southeastward from the islet. Turtles frequent this island in great numbers. The island has been reported (1958) to be a good radar target at a distance of 18 miles.

A light is shown from Pulau Sipadan.

12–78 Trusan Tando Bulong is a narrow winding strait between Pulau Bum Bum and Creagh Reef on the east and the coast of Borneo on the west. It has a least navigable width between the reefs on either side of about 1/4 mile. The tidal current runs with considerable strength through this strait and the edges of the reefs are sometimes difficult to discern.

The least depth in the fairway is 7 fathoms near the southern entrance, but a shoal, with a depth of 5 fathoms, extends more than half way across the channel from the eastern side of the northeastern entrance. Vessels proceeding to the Sungei Seboekoe from the northward effect a great saving in distance by using this passage.

Detached shoals, with depths of 2¾ and 5 fathoms, lie about ¾ mile northwestward and ½ mile north-northwestward, respectively, of the beacon which stands on the northwest edge of the reef extending about 1 mile northward from the northwest point of Pulau Bum Bum. A conical buoy, with red and white horizontal bands, is moored about ½ mile northwestward of the beacon. A 3¾-fathom patch is located about ¾ mile west-northwestward of the same beacon.

The settlement of Semporna is located on the western side of the strait, about 1 1/2 miles southwestward of the northwestern extremity of Pulau Bum Bum.

Daisy Islet lies on the edge of the fringing reef on the eastern side of the channel, 2 1/4 miles southward of the northwestern extremity of Pulau Bum Bum. Abreast this islet and located on the western side of the channel is a small inlet much encumbered by reef.

(5882) **EAST INDIES—Borneo—East coast—Darvel Bay—Trusan Tando Bulong approach—Depths—Buoy moved.**—1. The beacon (4°30′48″ N., 118°-37′27″ E. approx.) will be recharted 0.1 mile 180° from charted position.

2. The following depths will be charted as indicated; distances and bearings from the recharted beacon in (1):

(*a*) 3 fathoms; 0.50 mile 319°30′.

(*b*) 5 fathoms; 0.57 mile 305°.

3. The following depths are nonexistent and will be expunged:

(*a*) 2¾ fathoms (rep 1958) (PA) about 0.4 mile northward of (2*a*).

(*b*) 3¾ fathoms Rep (1959) about 0.4 mile west-southwestward of (2*a*).

(*c*) 5 fathoms close northward of (2*b*).

4. The red and white buoy will be relocated about 0.15 mile northwestward to a position 0.6 mile 309°30′ from the recharted beacon in (1).

(N.M. 37/66.)

(N.M. 31 (1383), London, 1966.)

H.O. Charts **2116, 2117.**

H.O. Pub. 71, 1951, page **294.**

There is an inlet on the western side of the strait, entered about 1 3/4 miles northward of Pulau Sipanggau. The entrance to this inlet is about 350 yards wide between the reefs, with a depth of 8 fathoms, which shoals to 3 fathoms, 3/4 mile within. The inlet extends in a north-northwesterly direction for about 1 3/4 miles, whence it divides into two arms, Kuli Babang on the southwest, and Lok Bakong on the north. On the eastern side of the latter is Lok Bakong Hill, a conspicuous conical hill, 595 feet high, located about 4 1/2 miles south-southwestward of the northwestern extremity of Pulau Bum Bum. This hill forms the western end of a detached range of hills, the easternmost summit of which is Hood Hill, 525 feet high, located about 1 mile eastward of Lok Bakong Hill.

Mt. Connor (4° 24′ N., 118° 34.5′ E.), 1,280 feet high, lies 1 1/4 miles westward of the southwestern entrance point of the inlet.

The islets of Sipanggau, Nusatongga, and Menampilik have been described along with Creagh Reef in sec. 12-64.

Tagassan Bay is a small inlet entered on the northern side of Tanjong Tutup, the western entrance point of the southern end of Trusan Tando Bulong. The inlet is 1 mile between the entrance points, but the shore reef, that dries, extending 600 yards northeastward from Tanjong Tutup, and a mud flat, extending 1/2 mile southward from the northern entrance point of the inlet, narrow it considerably. On the northern entrance point there is some cleared grassy land where a village was formerly located, and is now named Pakalangan.

12-79 Beacons marking Trusan Tando Bulong.—Small wooden beacons, which are unreliable, are located in the following positions:

A beacon is located on the northwestern edge of the reef extending about 1 mile northward from the northwestern point of Pulau Bum Bum.

Two beacons, 1/2 mile apart, are located on the western edge of the reef extending from the northwestern point of Pulau Bum Bum.

Two beacons, 1/2 mile apart, are located on the eastern edge of the reef on the western side of the strait northward of the settlement of Semporna.

Four beacons, 1/3 to 1/2 mile apart, are located on the eastern edge of the reef eastward of Hood Hill and two beacons are located on the southeastern edge of the reef southward of Hood Hill.

A beacon is located on the west edge of Creagh Reef about 1/2 mile southwest of the southwest extremity of Pulau Bum-Bum.

A beacon is located on the northern side of the entrance to the inlet southward of Hood Hill, at the extremity of the reef extending from that side. Another beacon marks the southwest entrance of this inlet.

A beacon stands on the northwest edge of Creagh Reef, about 3 miles northeast and 1/2 mile north, respectively, of Pulau Sipanggau.

Two beacons are located west of the detached coral reef northwest of Pulau Sipanggau.

The beacons on the western side of the strait are painted in black and yellow vertical stripes; those on the eastern side in red and white checkers.

12-80 Tides.—The high-water interval at Semporna is 5h. 33m. The mean range is 3.8 feet, and the spring range is 5.2 feet. The tides are affected by diurnal inequality, the greatest difference between two successive high waters being 2 feet. This is attained when the moon is at its greatest declination, north or south. When the sun is north of the equator the highest high water is the a.m. tide; when the sun is south of the equator the highest high water is the p.m. tide.

12-81 Tidal currents.—In Trusan Tando Bulong the flood current sets to the southward and the ebb to the northward, with a strength of 3 to 4 knots at springs. The currents are strongest in the northern part of the channel between Pulau Bum Bum and the mainland.

12-82 Directions.—Vessels approaching from the northward, after passing between Pulau Larapan and the reef on which Pulau Sabangkat lies (see sec. 12-51), will recognize the entrance to Trusan Tando Bulong by Hood Hill, lying right over it; there are no hills on Pulau Bum Bum. From a position with the center of Pulau Larapan in range with Tanjong Sidongal, bearing about 345°, and the northwestern extremities of Pulau Sabangkat and Pulau Gaya in range, bearing about 049°, the opening between the reefs, which extend from either side of the entrance, will be easily distinguished. The zinc-roofed house at Semporna and the conspicuous white customhouse building located on the end of the pier will also be seen. From the above point vessels should steer for the inner end of the pier at Semporna, bearing 177°.

This course will lead over the tail of the 5-fathom shoal extending from the eastern entrance point. When the northwestern extremity of Pulau Bum Bum bears 087°, keep in midchannel and pass about 200 yards off the head of the pier at Semporna; thence steer for the point on the western side of the channel east-northeastward of Hood Hill, bearing 147°, passing 400 yards southwestward of Daisy Islet; on rounding the point be guided by the beacons which stand on the edge of the fringing reef on the western side of the channel. Then steer for Pulau Sipanggau, bearing 217°, which leads about 200 yards from the edge of the reef off the southwestern point of Pulau Bum Bum, and thence the same distance from the reef on the western side which is marked by beacons southward of Hood Hill.

From this point the channel widens somewhat, and vessels should have little difficulty in keeping in midchannel. The only known dangers outside the fringing reef on either side of the southern part of the strait are two small coral patches on the eastern side; one patch marked by two beacons, lies northwestward of Pulau Sipanggau and 400 yards beyond the edge of the reef. The other patch lies westward of the southern end of Pulau Nusatongga and 300 yards beyond the edge of that part of the reef.

Vessels approaching from the southward and entering the southern end of Trusan Tando Bulong from Ligitan Channel may pass between Pulau Gusungan reef and the southwestern extremity of Creagh Reef. The channel is about 1/2 mile wide, but the edges of the reef are not always easily distinguished. Vessels using this channel should bring the northern summit of Double Hill (4° 24.6′ N., 118° 26.3′ E.) over the western extremity of the rocky point forming the western extremity of Tanjong Tutup, bearing 309°, which leads well clear of the reef on either side of the channel.

Double Hill is a saddle-shaped hill, 760 feet high, lying almost 7 1/2 miles west-northwestward of Tanjong Tutup.

Vessels approaching from the southwestward should keep the northwestern extremity of Pulau Menampilik in range with the southeastern extremity of Pulau Nusatongga, bearing 66°, which leads northwestward of Pulau Gusungan and thence into the southern entrance to Trusan Tando Bulong.

Anchorage with good holding ground can be taken about 400 yards off the pier at Semporna.

Anchorage is prohibited to vessels carrying explosives or dangerous petroleum in Trusan Tando Bulong southward of the parallel of the northern end of Pulau Bum Bum, or in the approach fairway.

12-83 SEMPORNA is a small settlement on the western side of Trusan Tando Bulong, 1 1/2 miles within the northern entrance. A pier, about 40 feet long at the end of a 400 yard coral causeway, and with a least depth alongside of 17 feet (1960), extends nearly 1/4 mile off the shore reef into deep water. There is a police station, custom house, and a considerable number of natives. The District Officer from Lahad Datu visits this settlement periodically.

A Singapore passenger vessel calls weekly.

12-84 COAST—Tanjong Tutup to the Sungei Kalumpang.—Between Tanjong Tutup, the southwestern entrance point to Trusan Tando Bulong, and a point near the entrance to a small river, about 2 1/2 miles westward, the coast is rocky and backed by high hills. From this point to Tanjong Nagos, 6 1/4 miles farther westward, the coast is low and bordered with mangroves.

Between Tanjong Nagos and a point 5 1/4 miles westward there is a bay into which the Sungei Kalumpang (Kumpong River) flows. Pulau Kalumpang (Kumpong Kumpong Island), 280 feet high, and densely wooded, lies in this bay at the mouth of the river. The main entrance to the river is on the eastern side of the island. The narrow channel on the western side of the island nearly dries. A small village lies on the northern side of the island.

The Sungei Kalumpang has a depth of not more than 3 or 4 feet over the bar at low water, but within the entrance the river has depths of 1 1/2 to 6 fathoms. On entering, it appears as a fine broad river with two branches, joining at 2 1/2 miles from its mouth and enclosing a long narrow island.

The river was ascended by a small craft for 8 miles from the mouth, at which point the water was brackish. Further progress was barred by the banks narrowing and by the interlacing of the foliage overhead, but there was still a depth of 2 fathoms. Two branches of the river taking a (continued on page 297)

(4308) **EAST INDIES—Borneo—East coast—Sibuko Bay—Friedrich Haven—Chart amendment.**—The name *Horn Reef* should be charted against the **Fl.** light (4°15.9′ N., 118°25.1′ E. approx.).

(See N.M. 41(5473) 1962.) (N.M. 33/63.)

(N.M. 29(1453), London, 1963.)
H.O. Charts **2117,** 3044, 5592.
H.O. Pub. 112, No. **28744.**
H.O. Pub. 71, 1951, page **297.**

southerly direction were also explored, both ending similarly in deep narrow creeks.

The mangrove ceases at 4 miles from the mouth; higher up the banks are clothed with nipa palms, with occasionally a red earthy bank appearing on one side and swamp on the other. The river is singularly free from snags or obstructions of any kind. From the topography of the country it must drain a considerable area. There were no signs of inhabitants.

12–85 Aspect — Landmarks. — Immediately northward of Tanjong Nagos there is a wooded range of hills, from 840 to 1,200 feet high, and 6 1/4 miles north-northwestward of the point is Mt. Pock, 1,860 feet high, the westernmost peak of a range extending northeastward. This range is separated from the wooded range to the southward by a deep valley. Mt. Pock is the summit of the ranges on the eastern side of the valley of the Sungei Kalumpang.

Pulau Silungan, a small wooded islet, 170 feet high, lies 1 1/2 miles from the coast and 6 miles west-southwestward of Tanjong Tutup. This islet serves as a good landmark for vessels using the narrow channels in this area.

12–86 Off-lying dangers—Mabul Passage to Friedrich Reef including Ligitan Reefs—Beacons. —The Ligitan Reefs are a series of detached reefs, with shoal water between them, fronting the north coast of Sibuku Bay at a distance of 3 3/4 to 7 miles from the shore. These reefs extend a distance of 9 miles to the westward from Mabul Passage. On the southern side of these reefs the bank on which they lie is very steep-to.

The easternmost and largest of the Ligitan Reefs has a length of 2 3/4 miles in a northwesterly and opposite direction, and has a breadth of about 1 3/4 miles. Several small detached reefs lie close off its northern side. A deep channel, 1 1/2 miles wide, passes to the northward of these detached reefs between them and the southern side of the reef which encloses Pulau Gusungan. This channel connects Ligitan Channel with the Friedrich Haven Channel to the westward.

Near the middle of the Ligitan Reefs there is a break in their continuity 2¼ miles wide, and through the western side of this opening there is a channel with a least depth of 4¾ fathoms. This channel passes close to the eastward of the westernmost reef and lies about 3¾ miles southward of Pulau Silungan.

A 3½-fathom patch lies 1¼ miles west-northwestward of the northwestern entrance to the above channel.

The westernmost reef of the Ligitan Reefs is L-shaped and extends about 2½ miles westward from the narrow passage, and thence 1¾ miles northward from that point.

A light beacon stands on the north extremity of this reef.

Erzherzog Reef is separated from the westernmost of the Ligitan Reefs by a deep channel, 800 yards wide. The reef is 1½ miles long in an east-northeasterly and opposite direction, and has on its northern side a sand cay that dries 6 feet.

A small detached reef lies 1/2 mile northeastward of Erzherzog Reef, with a deep channel 1/3 mile wide passing between them. Another deep channel, 1/2 mile wide, separates the detached reef from the westernmost Ligitan Reef lying to the eastward.

Friedrich Reef is a small detached reef with a sand cay on its northern side, that dries 7 feet at low water. It is located about 4 1/4 miles southward of Pulau Kalumpang, and lies 1 3/4 miles westward of Erzherzog Reef, with a clear passage between.

12–87 Friedrich Haven (Friedrich Haven Channel.)—This channel lies between the northern shore of Sibuku Bay on the north, and Ligitan, Erzherzog, and Friedrich Reef on the south. The least width of almost 1 mile lies between the 6-fathom curve fronting the northern shore and the 6-fathom curve fronting the western horn of the Ligitan Reefs. This horn can generally be

distinguished. The least depth found in the fairway is 6 1/2 fathoms, mud.

12–88 Anchorage.—Anchorage may be obtained in a depth of 6 fathoms, mud, with the northwestern extremity of Pulau Silungan in range with Mt. Connor, bearing 55°, and the summit of Pulau Kalumpang, bearing 324°.

12–89 Tidal currents.—The flood current sets southward and westward through Friedrich Haven Channel, and the ebb northward and eastward at a rate of 3/4 knot.

12–90 Directions.—Vessels approaching from the southwestward should approach Friedrich Haven with the northwestern extremity of Pulau Silungan in range with Mt. Connor, bearing 55°, passing between Egeria Shoal and Roach Reefs (see sec. 12–93), and close northwestward of Friedrich Reef, the sandbank on which will generally be seen when approaching it. After passing this reef, if bound for Trusan Tando Bulong or Ligitan Channel, vessels should steer for the summit of Pulau Menampilik, bearing 67°. This course leads in mid-channel between the northern extremity of the westernmost of the Ligitan Reefs and the edge of the shoal as defined by the 6-fathom curve extending from the northern shore.

A good mark for clearing the northern extremity of the easternmost Ligitan Reef and for entering Ligitan Channel from Friedrich Haven Channel is to bring the northern extremity of Pulau Silungan in range with the summit of a 1,076-foot peak, 1 1/2 miles northwestward of Tanjong Nagos, bearing 291°.

12–91 Coast—Western entrance of Sungei Kalumpang to Batu Tinagat.—The coast is low and bordered with mangrove between the western entrance point to the Sungei Kalumpang and the eastern entrance of the Sungei Balung, about 9 miles westward.

Saddle Hill lies on the eastern side of the entrance to the Sungei Balung. This hill has two humps, 1 1/4 miles apart, the eastern being 330 feet high, and the western 450 feet high.

The Sungei Balung, a narrow winding river, has a width of only 150 yards at its entrance points, increasing to 400 yards within. The entrance to the river lies between two banks of sand and mud projecting in a southerly direction from the mouth; the bank on the eastern side dries for a considerable distance; that on the western side dries for about 3/4 mile, beyond which it has depths of 2 to 6 feet. The narrow channel between the two banks has a depth of about 1 1/2 fathoms, and depths of 3 to 5 fathoms are found in the lower reach of the river.

The river takes its rise between Mt. Wullerstorf and Mt. Lucia, and flows in a southerly and easterly direction to the foot of one of the spurs running down from Mt. Wullerstorf, and thence turns southward toward Saddle Hill. The lower part of the river has been examined for 6 miles within the entrance, or about 4 miles in a direct line from the coast, at which point the river was 90 feet wide with a depth of 1 1/2 fathoms. The mangrove swamp extends to about 1 1/2 miles from the coast and from that point the river bank is lined with nipa palms.

Between the western entrance point of the Sungei Balung and Batu Tinagat, about 12 miles west-southwestward, the coast is low and is fronted by a mud flat, that dries for almost 1/2 mile from the shore. The Sungei Apas, a small river with a depth of about 1 foot on its bar, flows out on this coast about 5 miles east-northeastward of Batu Tinagat.

Batu Tinagat (*4°13′ N., 117°59.5′ E.*), a small mushroom-shaped rock, 15 feet high, lies close off the point formed by a spur of the Batu Tinagat Hills (see sec. 12–63).

The 3-fathom curve follows the coast from off Pulau Kalumpang to off the entrance to the Sungei Balung at a distance of up to about 2 miles, with rocky ledges at its edges in places. From abreast of the Sungei Balung it runs westward and then curves southward and southeastward, increasing its distance from the shore to 5 1/2 miles at a position 7 miles south-southwestward of the westernmost Saddle Hill; here it makes a sharp elbow, known as English Spit, and then turns in a westerly direction towards

Batu Tinagat, passing that rock at a distance of 2/3 mile offshore.

The 6-fathom curve, which is close to the 3-fathom curve off the entrance of the Sungei Balung, makes a similar elbow at 2 to 3 miles southward of English Spit and again closes the 3-fathom curve off Batu Tinagat.

A reef, that dries, was reported to lie about 3 miles south-southwestward of the western summit of Saddle Hill. The shoal water between this reef and English Spit was reported to be extending to the eastward.

12-92 Light.—Batu Tinagat Light, is located on the south slope of Mt. Putri, about 1 mile westward of Batu Tinagat.

12-93 Off-lying dangers lying between approaches to Tawau and Friedrich Haven—Beacons.—Darby Bank, with a least depth of 36 feet, coral, is the outermost danger in the southwestern approach to Friedrich Haven, and lies about 11 1/2 miles southward of the eastern summit of Saddle Hill.

Hand Rock, awash, lies on a small coral bank on the edge of the 20-fathom curve, and is located about 9 1/2 miles southward of the western summit of Saddle Hill. This rock, which marks the turning point between the southwestern approach to Friedrich Haven and the channel leading to Tawau, is about 200 yards in length east and west, and 100 yards wide. It constitutes a real danger as it is barely awash.

A steel beacon, surmounted by a globe painted in black, white, and red horizontal bands, stands on Hand Rock. It is very difficult to see when bearing between north and west, due to the dark background. The beacon is equipped with a radar reflector. A 1 1/2-fathom patch was reported (1959) to lie about 4 1/2 miles west-northwestward of the beacon.

MT. KUKUSAN (4° 16.5′ N., 117° 52′ E.), bearing 300°, kept well open southwestward of Mt. Putri, leads southwestward of Hand Rock and Darby Bank. These dangers are covered by the red sector of Batu Tunagat Light.

A shoal, with a depth of 1 foot, sand and coral, lies about 3 miles north-northeastward of the beacon on Hand Rock.

Alert Patches, consisting of three coral shoals with deep water between them, have a least depth of 25 feet on each, and extend from about 1 1/2 to 4 1/2 miles north-northeastward of Darby Bank. The southernmost patch lies 9 3/4 miles southward of the eastern summit of Saddle Hill. The two northern patches, 1 mile apart east and west, lie almost 9 miles south-southeastward of the same point.

Navigators are cautioned not to cross Darby Rock or Alert Patches as less depth than that charted may be found.

Roach Reefs are two reefs 1/4 mile apart, lying on a narrow shoal that extends 1 mile northeastward from its southeastern extremity located about 1 mile east-northeastward of the north-easternmost Alert Patch, and about 9 miles southeastward of the eastern summit of Saddle Hill. The northeastern and larger of these reefs dries 2 feet.

A coral patch, with a least depth of 25 feet, lying about 1 1/4 miles northeastward of the larger reef, is located about 7 1/2 miles south-southwestward of the 200-foot hill on the southern side of Pulau Kalumpang.

Egeria Shoal is a small coral patch, with a depth of 13 feet, lying about 6 1/4 miles south-southeastward of the eastern summit of Saddle Hill. It lies on the northwestern side of the fairway to Friedrich Haven and has a clear passage 3 miles wide between it and the Roach Reefs to the southeastward.

A small narrow reef, nearly awash, lies 3/4 mile north-northeastward of Egeria Shoal, and about 5 1/4 miles south-southeastward of the eastern summit of Saddle Hill.

Heel Reef, a small patch of rotten coral and mud, which dries 2 feet and is steep-to, lies 4 1/2 miles south-southeastward of the eastern summit of Saddle Hill.

A light is shown from a structure which stands near the center of Heel Reef.

A reef that dries 3 feet lies 2 miles north-northwest of Heel Reef.

Chance Rock, a small coral head, with a depth of 9 feet, and steep-to, lies on the north-

western side of the fairway about midway between Egeria Reef and Friedrich Reef. It is located about 7 miles southeastward of the eastern summit of Saddle Hill.

Lehnert Reef, sand and coral, which dries 2 feet near its southern end, lies 4 miles southeastward of the eastern summit of Saddle Hill. Discolored water lies close off the southern side of this reef.

A yellow single-pile beacon, surmounted by a black and yellow cone, point up, stands on the south end of the reef.

A narrow reef lies 2 miles southwestward of the southern point of Pulau Kalumpang, and another reef lies about 1 mile offshore and 4 1/2 miles westward of the same point. These two reefs lie within the 3-fathom curve fronting the northern shore.

12-94 Caution.—Egeria Shoal, Heel Reef, Chance Rock, and Lehnert Reef are all difficult to discern under certain conditions of light, due to the muddy water in their vicinity.

12-95 DIRECTIONS.—FRIEDRICH HAVEN TO TAWAU—Outer route.—The outer route from Friedrich Haven passes southeastward of Chance Rock and Egeria Shoal, and between Alert Patches and Hand Rock. After passing close northwestward of Friedrick Reef (see directions for Friedrich Haven Channel in sec. 12-90) vessels should keep the northern extremity of Pulau Silungan in range with Mt. Connor, bearing 055°, astern. This course leads between the above dangers, and 3/4 mile southeastward of the beacon on Hand Rock, which marks the eastern approach to Tawau.

12-96 Inner toute.—From a position about 1/2 mile northward of Friedrich Reef, the sand cay on which can be identified (see directions for Friedrich Haven Channel in sec. 12-90), steer 265°, which will lead about 2/3 mile southward of the beacon on Lehnert Reef, and the same distance northward of the light structure on Heel Reef. When the western summit of Saddle Hill bears 345°, alter course to 210°. This course will lead 1 mile northwestward of the 1-foot shoal lying 3 miles north-northeastward of the beacon on Hand Rock, then about 1/4 mile southeastward of the elbow in the 6-fathom curve off English Spit, and 1 1/4 miles northwestward of the beacon on Hand Rock.

Hand Rock and the 1-foot shoal constitute serious dangers and great care must be taken in passing them. Soundings should give warning if the southeastern edge of English Spit is being approach too close; if depths of 7 to 8 fathoms are maintained a vessel will ensure passing this spit at a safe distance.

Directions for entering the main channel leading to Tawau are given in section 12-107.

12-97 PULAU SEBATIK—Boundary beacons.—This large island is about 20 miles in length in a west-northwesterly and opposite direction, and has a greatest width of about 8 miles. It is separated from the mainland to the northeastward by a channel 3 1/2 to 5 miles wide, but to the northwestward of the island there is a channel only 1/2 mile wide separating it from the deltas of the Sungei Serudong and the Sungei Simandalan.

A range of densely wooded hills traverses the island throughout its length. Mt. Antoinette, 1,550 feet high, the summit of this range, lies near the center of the island, about 10 1/4 miles southwestward of Mt. Kukusan. Cornelis Peak (4°07′ N., 117°53′ E.), 550 feet high, near the eastern end of the island, serves as a good landmark for vessels approaching Tawau and Cowie Harbor from the eastward and southward.

The boundary line between British and Indonesian territories, on the parallel of 4°10′ N., passes approximately through the center of Pulau Sebatik. The position where the boundary line cuts the east coast of the island is marked by a stone beacon on the edge of the mangrove swamp. A boundary stone also marks the spot where the line cuts the southwestern coast.

A buoy, painted in red and white checkers, marking the limit of North Borneo territorial waters, is moored about 12.2 miles bearing 075° from Cornelis Peak.

12-98 Eastern side of Pulau Sebatik—Dangers.—Between Stone Point (Steenenhoek) (4°03.8′ N., 117°55.3′ E.), the southeastern extremity of the island, and East Point, about 3 3/4 miles northward, the sandy beach is backed by red cliffs, 20 to 80 feet high; the country inland is low and densely wooded.

Several patches of rocks, some of which dry and others with a depth of less than 6 feet over them, lie within 1 mile eastward and northeastward of Stone Point. About 1 1/2 miles southwestward of the point and close inshore there is a rock above water.

A reef of sand and coral, that dries 1 foot, lies 1 3/4 miles southeastward of Stone Point.

Padang Bank, a shoal with a depth of 3 feet, on which the sea breaks, lies 2 miles south-southeastward of Stone Point.

Makassar Banks, whose west extremity lies 4 1/4 miles south of Stone Point is an elongated shoal, two parts of which are awash, about 4 1/4 miles long. A shoal ridge, with depths of less than 6 fathoms, extends 3 1/2 miles eastward from the eastern extremity of the above shoals; the easternmost part of this shoal ridge lies 9 1/4 miles southeastward of Stone Point.

The channel between the Makasser Banks and Padang Bank has depths from 5 to 7 fathoms.

At East Point there is a hard sandy beach backed by high casuarina trees, and a sand and mud flat, which dries, extending 1 1/2 miles eastward from the point; it is not so soft as the flats of unmixed mud farther northward.

A sandbank, that dries 4 feet, lies about 1 3/4 miles northward of East Point, and 1 mile offshore. It is separated from the mud flats fronting the coast by a narrow channel. The outer edge of this sandbank is steep-to, as is also the edge of the shoal extending offshore between the sandbank and Tanjong Saima, the northeastern point of the island. The depths decrease suddenly from 6 to 2 fathoms along this stretch.

Tanjong Saima is low and bordered with mangroves, and is not easily identified. A sandbank lies about 1/2 mile northward of the point. This sandbank dries 4 feet and has a depth of about 8 fathoms between it and the mud flat fronting the coast. A 3 1/4-fathom patch lies close westward of the sandbank.

12-99 OFF-LYING DANGERS IN SOUTHERN APPROACH TO TAWAU.—Oenarang Rock, which dries 1 foot, and is steep-to, lies 10 miles east-southeastward of Stone Point, and is the southernmost outer danger in the approach to Tawau. The main channel in the approach lies between this rock and Hand Rock, which lies 9 3/4 miles northeastward and marks the inner and outer approaches from Friedrich Haven.

Dutch Spit is the eastern extremity of a shoal which extends about 5 3/4 miles eastward from Stone Point and the coast northward of it. A detached shoal, with depths of less than 3 fathoms, lies at the eastern extremity of Dutch Spit. Another detached shoal, with a depth of 2 3/4 fathoms, lies 1 1/2 miles north-northwestward of the extremity of the spit.

Shoal water, with depths of less than 6 fathoms, extends 5 1/4 miles northeastward and 9 1/4 miles eastward of Stone Point; the eastern extremity of this shoal water lies about 2 3/4 miles northward of Oenarang Rock.

12-100 CAUTION.—Vessels approaching Tawau from the southward should be careful in passing Oenarang Rock, and in rounding the easternmost end of the 6-fathom curve lying off Dutch Spit, 2 3/4 miles to the northward of the rock, especially at times of flood tide.

12-101 TAWAU, a principal port, is located in the northwest section of Sibuku Bay on the north side of the entrance to Cowie Bay. It is about five miles from the Indonesian border.

12-102 NORTH SIDE OF APPROACH TO TAWAU.—Between the point 1 mile westward of Batu Tinagat and the entrance to the Sungei Tawau, 4 3/4 miles westward, the coast is somewhat indented and forms a shallow bay. The shore of the bay is fringed with mangrove, and is fronted by mud flats, which dry, extending from about 1/4 to 3/4 mile offshore.

The coast between the entrance to the Sungei Tawau and Tawau, 1 1/4 miles westward, is bordered with coconut plantations, and is fronted by a bank of mud and sand which extends from 200 to 800 yards offshore, and dries from 2 to 4 feet.

A LIGHT is shown on the center of the T-head of the pier at Tawau.

12-103 CHANNEL—DANGERS.—The entrance to the channel leading to Tawau lies between Hand Rock and Oenarang Rock, 9 3/4 miles southwestward. These dangers are covered by the red sector of Batu Tinagat Light. The northeastern side of the channel is formed by the limit of the 6-fathom curve that extends about 8 miles southeastward from Batu Tinagat. The southwestern side of the channel is formed by the limit of the 6-fathom curve that lies 9 1/4 miles eastward and 5 3/4 miles northeastward of Stone Point (Steenenhoek). The channal has a least width of about 5 miles at its outer end and narrows to about 2 3/4 miles between Tawau and Tanjong Saima, the northeastern point of Pulau Sebatik. The channel has a least depth of 6 1/2 fathoms and is generally free from dangers except for a 6-fathom patch near the northern side of the outer part, and a few shoals lying close off the 6-fathom curve, near the inner part of the channel.

A 6-fathom patch, 1/2 mile in extent, lies 5 miles southeastward of Batu Tinagat.

Swirl Patch, with a depth of 2 1/4 fathoms, coral, lies 2 miles west-southwestward of Batu Tinagat, and almost 1/2 mile outside the 6-fathom curve fronting the shore. It may be easily discerned by the swirl and eddies over it.

Moysey Shoals, with a least depth of 1 1/2 fathoms, lies about 3/4 mile south-southwestward of the south entrance point to the Sungei Tawau, and about 1/4 mile off the 6-fathom curve fronting the shore.

Harbor Shoals comprise several patches, with depths of 3 2/3 to 5 1/2 fathoms over them, located between the Moysey Shoals and the pier at Tawau, about 1 mile northwestward. The southwestern limit of these shoals lies about 1/2 mile south-southeastward of the pier at Tawau.

Wicks Rock, awash, lies about 1 mile northwestward of Tawau pierhead, 1/3 mile offshore within the 6-fathom curve.

12-104 ANCHORAGE.—The immediate approaches to Tawau and Cowie Bay offer spacious anchorage to large deep-draft ships. There are depths in the approaches of 7 fathoms and general depths in Cowie Bay of 4 to 18 fathoms.

Anchorage may be obtained, in a depth of 7 1/2 fathoms, mud over hard sand, with the pierhead bearing 124°, distance 2/3 mile.

Anchorage may also be obtained, in a depth of 8 1/2 fathoms, mud over hard sand, with the pierhead bearing 112°, distance 1/2 mile.

Anchorage is PROHIBITED within a distance of 1/3 mile of the seaward side of the light structure located on the pierhead.

Special anchorage areas, each 1 mile square, are located in Tawau Harbor as follows (measured from Tawau pierhead): Quarantine—northwest corner, 1 1/3 miles southeastward; Explosives—northeast corner, 2 miles southwest-by-southward; Petroleum—southeast corner, 1 1/4 miles west-northwestward.

12-105 TIDES.—Tidal heights above datum of soundings are:—M.H.W.S. 8.8 feet; M.H.W.N. 6.0 feet; M.L.W.N. 3.9 feet; M.L.W.S. 1.1 feet.

12-106 TIDAL CURRENTS.—The spring range of the tide off Tawau government pier is approximately 10 feet. At springs the flood current may attain a maximum rate of almost 2 1/2 knots about 1 1/2 hours after low water. The ebb may obtain a maximum rate of just over 2 1/2 knots about 2 hours after high water.

The average direction of the flood current is 308° which is 9° different from the 119°-299° alignment of the government pier. A vessel stemming the flood and berthing 1 1/2 hours after low water springs will be likely to find a component of the current equal to almost 1/2 knot setting on the pier. The average direction of the ebb current is 131° which is 12° different from the pier alignment. A vessel stemming the ebb and berthing 2 hours after high water will be likely to find a component of the current equal to more than 1/2 knot setting off the pier. Maximum current conditions, such as those described in the above examples, are comparatively rare. A neap range as small as 3 feet may occur; at which time the current may be scarcely appreciable. With a neap range of 5 feet a maximum flood rate of 1 knot and an ebb rate of 1 1/4 knots may be expected.

Southward of English Spit the flood current runs west-northwestward at a rate of 1/2 knot and the ebb current east-southeastward at a rate of 3/4 knot.

Off the eastern end of Pulau Sebatik the flood current sets northwestward at a rate of 1 1/4 knots and the ebb southeastward at a rate of 1 1/2 knots.

Tidal current signals are displayed by day from the main light structure. A cone point up indicates an east-going current, and a cone point down indicates a west-going current.

12-107 DIRECTIONS.—Vessels comming from Friedrich Haven through either the inner or outer routes (sec. 12-95 and sec. 12-96), on opening out Mt. Kukusan, bearing 302°, well clear westward of Mt. Putri, may steer 294° up the channel. Care must be taken to bring Mt. Kukusan to bear more than 312° by the time Mt. Putri is abeam in order to avoid Swirl Patch, which danger will be passed when Saddle Hill is lost sight of behind Batu Tinagat Hills. Mt. Kukusan, seen to the westward of Tawau Point, bearing 357°, leads towards the anchorage, westward of the Moysey and Harbor Shoals, and when the extremity of the pierhead bears 024° the anchorage can be steered for.

Vessels approaching from the southward after passing well outside of Oenarang Rock and the tip of the 6-fathom curve 2 1/2 miles northward of it, can follow the directions as given above.

Pilotage.—One pilot was reported (1962) as available in the port.

12-108 TAWAU (4°15′N., 117°53′E.).—The town of Tawau extends along the shore from Tawau Point for about 1 mile on the north side of the entrance of Cowie Bay. There are large rubber, coconut and hemp estates in the developed area within a radius of 10 miles of the town, but the main source of income is the interport trade in copra. The District Officer resides at the government station. The chief exports are rubber, coconuts, timber, livestock, copra, and agricultural porducts.

The population of Tawau was reported (1966) to be about 11,000.

Government pier, a T-head reinforced-concrete decked structure, is 650 feet long on the outer face, 50 feet wide, and about 400 feet long on the eastern inner face. The approach is 247 feet long and 40 feet wide. Island mooring dolphins, 850 feet apart and connected to the pier by walkways are located off each end of the pier. In 1965, least depths at chart datum were reported as: 13 feet alongside, 19 1/4 feet ten feet off the pier, and 24 feet twenty feet off the pier. The inner face of the pier is suitable for the accommodation of coasters. The pier is lighted and water can be supplied from the pier at a rate of 12 to 15 tons per hour.

Ships gear is used. A 2-ton crane is available. There was (1964) about 38,000 square feet of covered warehouse space. Additional covered warehouse space is scheduled for completion in 1968. Open storage is limited as the ground is low and swampy.

Vessels loading logs proceed to an anchorage off Tanjung Agas (section 12-116) the area being known as Wallace Bay. The vessel may clear in and out at Tawau or at Wallace Bay itself.

One tug, six launches, and several lighters were reported (1965) at Tawau.

SUPPLIES.—Fresh beef, vegetables, and jungle produce can be obtained. Filtered water can be supplied at the pier but it should be boiled before using. Diesel fuel can be supplied by small tanker.

REPAIRS.—There are facilities for very minor ship repairs.

COMMUNICATIONS.—There is regular steamer communication with other ports in the State of North Borneo and Indonesian ports also with Hong Kong, Manila, Java, and Japanese ports. There is regular air communication with Singapore twice weekly.

Tawau is connected to the general telephone system. There is a radio station open for public correspondence located here. Call sign VQC2 on 500 kcs.

HOSPITAL.—There is a government hospital in the town.

METEOROLOGICAL TABLE.—See Appendix II.

12-109 COWIE HARBOR (Cowie Bay).—Cowie Harbor is the name given to an extensive bay lying westward of Tawau and Tanjong Saima. A shallow delta intersected by a labyrinth of reeds, the shores of which are everywhere lined with mangroves, lies at the head of Cowie Harbor. Many rivers flow into the head of the bay, the principal being the Sungei Kalabakan.

The bay has been surveyed as far as the limits of navigation, 12 miles west-northwestward of Tawau, above which it becomes blocked across its entire breadth by numerous mud flats, between which are intricate channels leading to the various rivers. Both shores of the bay consist of low mangroves fronted by extensive mud flats, and present not distinct features. The depths in Cowie Harbor are regular in its center part, with depths of 7 or 8 fathoms, soft mud.

12-110 NORTH SHORE OF COWIE HARBOR.—From Tawau the coast trends in a

general west-northwesterly direction for 12 miles (the limits of the survey), and is intersected by numerous small creeks and rivers. The principal river is the Sungei Merutai, which flows out about 7 miles west-northwestward of Tawau, and can be ascended by launches for about 3 miles at high water. There is an anchorage off the mouth of this river in about 7 or 8 fathoms. Vessels sometimes load lumber at this anchorage, which lies 5 3/4 miles northwestward of the pierhead at Tawau, and about 1/2 mile offshore.

12-111 SOUTH SHORE OF COWIE HARBOR.—The south shore of Cowie Harbor is formed by the northern side of Pulau Sebatik. Tanjong Saima, immediately opposite Tawau, is a low mangrove point, not readily distinguished. From this point the coast of the island trends in a west-northwesterly direction for 7 miles to Prescott Point, forming a slight shallow bight. The coast then takes a westerly trend for 6 1/2 miles to Grassy Point, the northwestern point of the island.

Grassy Point is somewhat conspicuous, being the only hard ground on the northern side of Pulau Sebatik, and appears as a grassy opening of flat land fronted by clay cliffs, 30 feet high. For a distance of 2 miles eastward of Grassy Point a shoal, with depths of 3 feet to 1 1/2 fathoms, extends from 200 to 1,300 yards offshore; the northern part of the shoal then forms a spit that extends 1 mile farther eastward within the 6-fathom curve.

A channel, with a least depth of 6 fathoms, and about 2/3 mile wide, passes to the northward of this spit off Grassy Point and connects Cowie Harbor with a narrow channel known as Coal Mine Reach, which leads to the westward of Pulau Sebatik between it and Pulau Simandalan. (See section 12-113 for a description of Coal Mine Reach.)

12-112 SUNGEI KALABAKAN, a partially explored river flowing into the head of Cowie Harbor, has been examined for a distance of 22 miles following the course of the river, or 9 miles in a direct line from its mouth.

The mangrove swamp extends for 3 miles from the coast; higher up the banks are lined by nipa palms. The river varies in width from 90 to 120 feet, and has depths of 2 to 5 fathoms. There are very sharp bends in the river. At 6 miles in a direct line from the entrance the banks on both sides become higher with hard ground, and there are native huts with partially cleared land in their neighborhood. The river here begins to wind about considerably, and in several places the depth decreases to 1 fathom.

At the farthest point reached by the examining boats the river was about 90 feet wide, but a line of rapids barred further progress. Here the water was fresh.

The rate of current was about 1/2 knot.

12-113 HEAD AND SOUTHERN SIDE OF SIBUKU BAY—COAL MINE REACH.—The northern entrance of Coal Mine Reach lies between Grassy Point and Adolphy Point, the north entrance point of the Sungei Simandalan, about 1 mile northwestward. Coal Mine Reach, which extends southwestward between the northwestern side of Pulau Sebatik and the eastern side of Pulau Simandalan, has a least width of about 1/2 mile at its northern entrance, but the main channel narrows to about 400 yards near its southwestern end. This reach connects the southwestern side of Cowie Harbor with the mouths of the Sungei Simandalan and the Sungei Serudong, which flow into the northeastern and southwestern ends, respectively, of the reach.

WALLACE BAY, a timber loading center with a population of about 1,500 (1961), is a shallow indentation located on the northwest side of Pulau Sebatik, about 1 mile southwestward of Grassy Point. A 250-foot wooden jetty with a 75-foot T-head, depth of 20 feet alongside, projects from the shore in the vicinity of the powerhouse chimney. Minor repairs can be undertaken in the company's workshop. There is a 2-ton crane on the jetty. Cranes of 5- and 10-ton capacities are available on two lighters at the port. Fresh provisions are obtainable in limited supply. Communications include postal and launch service to Tawau and a radio station, call sign VQC2 on 500 kcs. A doctor and limited sick bay facilities are provided by the lumber company.

DANGERS.—Pilot Bank, a shoal with charted depths of less than 3 fathoms at its outer end, extends about 4 1/2 miles east-northeastward from Adolphy Point. Shoal water extends 1 1/4 miles farther eastward within the 6-fathom curve. Both this bank and that extending from Grassy Point are steep-to. Soundings give little warning, especially between Grassy Point and Adolphy Point where the navigational channel is about 1/2 mile wide.

Llewellyn Bank, an extensive mud flat that

dries in patches, extends from the eastern end of Pulau Simandalan between Griffith Point and Tanjong Agas on the southern side of the entrance of the Sungei Simandalan, towards Adolphy Point. Griffith Point and Tanjong Agas are located 3/4 mile westward and 1 1/3 miles south-southwestward, respectively, of Adolphy Point. The mud flat extends 1 mile northeastward from Tanjong Agas and 1 mile east-southeastward from Griffith Point, leaving a passage between its northern steep-to edge and Adolphy Point, of about 300 yards in width. This passage marks the entrance of the Sungei Simandalan.

The main channel of Coal Mine Reach is about 2/3 mile wide between the eastern side of this bank and the northwestern side of Pulau Sebatik.

The shoals in the vicinity of Grassy, Adolphy, and Agas Points vary considerably during the year due to the silt brought down by the heavy rains.

Drake Bank, a shoal of hard clay with a least depth of 23 feet, lies in midchannel near the southwest end of Coal Mine Reach. Depths of over 5 1/2 fathoms lie to the westward of this bank, between it and the southeastern side of Pulau Simandalan, 400 yards west-northwestward.

NAVIGATIONAL AIDS.—A fixed red light is shown from a position (approximate) 1 1/4 miles southwestward of Grassy Point. A prominent chimney is located close northeastward of the light structure.

The front light of a range is shown at an elevation of 20 feet from a white hut on piles (4° 16′ 23″ N., 117° 39′ 53″ E.). The rear light, shown at an elevation of 50 feet from a white wooden tower with a cone topmark, point up, 50 feet high, is located about 1/2 mile 264° from the front range structure.

A pair of range lights are located in the vicinity of the Coal Pier mentioned below. The front light is shown at an elevation of 18 feet from a white wooden hut on piles. The rear light, about 340 yards 222 1/2° from the front, is shown at a height of 64 feet from a white metal framework tower. A triangular topmark, point up, surmounts each light structure.

12-114 COAL PIER.—A coal depot and pier, lies on the southeast side of Coal Mine Reach, 3 miles southwestward of Grassy Point.

12-115 TIDAL CURRENTS.—In Coal Mine Reach the ebb current starts 1 hour after high water by the shore and attains a maximum rate of 2 1/2 knots at springs at half tide. The flood current commences about 1 1/4 hours after low water by the shore and attains a maximum rate of 2 3/4 knots at springs. Both ebb and flood, however, at times, run at a rate of 3 1/2 knots off Grassy Point and over Drake Bank.

12-116 ANCHORAGE.—Vessels may obtain anchorage 2/5 mile northward of the pier and about 1/5 mile from the shore in 7 fathoms. Smaller vessels can anchor nearer the pier.

Vessels loading timber in Wallace Bay usually anchor opposite the timber ponds, about 300 yards offshore in 8 to 9 fathoms.

12-117 DIRECTIONS.—From the anchorage off Tawau vessels should steer a course of about 285° for a distance of about 9 1/2 miles, passing along the north shore of Pulau Sebatik, westward of Prescott Point, about 1 mile off. This course leads across the tidal currents, and great care must be exercised. When the range lights, located in the vicinity of Adolphy Point, bear 264°, they should be steered for on that range. When in a position a little over 1/2 mile from the front range structure, the course should be altered to 222 1/2° with the range structures in the vicinity of Coal Pier ahead. When Tanjong Agas is abeam to starboard, the course can be altered to the right and anchorage can be taken in a position about 2/5 mile northward of the pier.

12-118 SUNGEI SIMANDALAN, a narrow river, extends for 7 miles in a general west-northwesterly direction to Caution Point at the northwestern end of Pulau Simandalan, beyond which it unites with the waters of the Sungei Kalabakan. This river, which separates the northern side of Pulau Simandalan from the mainland, is connected to the Sungei Serudong by a narrow passage named Trusan Merlin, which runs in a general southerly direction for a distance of about 4 miles from Caution Point.

The shores of the Sungei Simandalan are bordered with mangrove and are generally steep-to. No difficulty will be experienced in proceeding as far as Rendezvous Point, on the northern shore, about 6 1/4 miles above Adolphy Point, there being a least depth of 5 1/2 fathoms in the fairway, which is from 200 yards to 1/4 mile in width. The tidal currents do not exceed a rate of 1 knot.

Guide Bank fringes the southwestern shore for 1/4 mile southeastward of Caution Point, thereby narrowing the navigable channel at that point to upwards of 100 yards.

12-119 DIRECTIONS.—To enter the river steer for the extremity of the land on the southern bank, about 1/2 mile westward of Griffith Point, bearing 290°, in order to pass Adolphy Point at a distance of about 300 yards. This course leads about midway between the dangers off Llewellyn Bank and those close off Adolphy Point. After passing Adolphy Point alter course northward as Griffith Point is approached, in order to gain a mid-channel course, which should be preserved from here onwards. A vessel of moderate size will find barely enough room to swing if moored in the center of Long Reach, where the river banks are 350 yards apart, in a depth of 10 fathoms.

Great care must be exercised in rounding Adolphy Point as the ebb stream at springs sets sharply around it.

A vessel has anchored in midchannel, about 1/4 mile southeastward of Caution Point.

12-120 SUNGEI SERUDONG, a narrow winding river, separates the southern side of Pulau Simandalan from the mainland to the southwestward, and is connected to the Sungei Simandalan by Trusan Merlin, a narrow and twisting passage, which passes westward of the island. The river is entered between Doris Point, the southern extremity of Pulau Simandalan, and Monk Point, 3/4 mile south-southwestward. It trends in a general northwesterly direction for about 4 miles as far as the entrance to the Trusan Merlin and then curves to the southwestward for almost 2 miles. Here it resumes its northwesterly direction for a distance of about 1 mile to Merlin Point, which lies on the southern shore of the river. The river at Merlin Point is only about 200 yards wide and vessels of any size should not proceed upstream any further than this point. The river above Merlin Point is known as the Sungei Silimpopon, and at Dingle Point on the southwestern shore, about 2 miles above Merlin Point, the river is only about 250 yards wide. From Dingle Point it narrows rapidly, and is blocked by a flat over which there was, in 1910, a depth of 6 feet. About 1 1/2 miles above Dingle Point rising ground commences on the left bank, and from here to 1 1/2 miles farther, the river is very narrow and tortuous and can be ascended by launches at half-tide.

The navigation of the river presents no difficulty as far as Merlin Point, and the tidal currents seldom exceed a rate of 1 knot. There is a least depth of 3 2/3 fathoms on Entry Flat which fronts the entrance to the river between Doris and Monk Points. A least depth of 4 1/2 fathoms is found on Watson Ridge, which crosses the river about 1 mile below Merlin Point. The shores are bordered with mangrove and are generally steep-to.

12-121 DIRECTIONS.—On entering the Sungei Serudong from Coal Mine Reach, a vessel should round Doris Point at a distance of 400 yards in order to avoid Duke Bank, a shoal, with depths of less than 1 fathom, extending 3/5 mile east-northeastward from Monk Point. The tangent of the land on the northeastern side of the first reach of the river, almost 2 miles west-northwestward of Doris Point, in range with Junction Point, 3 1/2 miles northwestward of Monk Point, bearing 301°, leads about 150 yards northeastward of Duke Bank as defined by the 3-fathom curve. When Doris Point comes in range with Tanjong Agas, bearing 054°, Duke Bank has been safely passed; the vessel should now alter the course a little to the westward and keep in midchannel as it proceeds upstream. Vessels of moderate size should not proceed beyond Junction Point, where swinging room will be found if anchored in 9 fathoms, 1/3 mile eastward from that point.

A vessel has anchored in MIDCHANNEL about 400 yards northwestward of Merlin Point, where sufficient swinging room was found.

12-122 TRUSAN MERLIN, a narrow and twisting passage, 4 miles long in a north and south direction, lies to the westward of Pulau Simandalan, and connects the Sungei Simandalan with the Sungei Serudong. The passage has a least width of about 150 yards and a least depth of 5 1/4 fathoms in the fairway near its southern end.

Clarke Creek, entered from the western

side of Trusan Merlin between Carrol Point, located about 1/2 mile southwestward of Caution Point, and Frenzel Point, has an entrance width of about 150 yards and is suitable only for launches because of its extreme narrowness. About 1 1/2 miles within the entrance to this creek there is firm ground which rises to a height of 1,100 feet. The land everywhere is densely wooded.

The navigation of Trusan Merlin presents no difficulties for a handy-steering vessel, but there is scarcely room for vessels to pass if meeting and unprepared.

The rate of the currents, which enter the passage from both ends, does not exceed 1 knot.

12-123 DIRECTIONS.—Vessels entering Trusan Merlin from the Sungei Simandalan should pass Caution Point at a distance of 75 yards, as flats extend some distance offshore on the opposite (continued on page 307)

bank. The turn at the entrance is very sharp making a rapid course change necessary of about 10 points. Vessels should then keep in mid-channel and after passing the narrowest part of Trusan Merlin, at Herold Point, about 2 1/4 miles below Caution Point, care should be taken not to mistake the entrance to Deceive Creek, about 2/5 mile southeastward of Herold Point, for the main channel.

12-124 SOUTHEASTERN APPROACH TO THE SUNGEI SERUNDONG.—The approach to the Sungei Serudong from the southeastward lies between the southwestern side of Pulau Sebatik and the northeastern side of Poelau Oost Noenoekan. A channel 1 to 2 miles wide separates the two islands.

Poelau Oost Noenoekan, a somewhat circular island about 11 miles in diameter, is 876 feet high near its southeastern side and densely wooded. A shoal spit, with depths of less than 3 fathoms, extends 13 miles eastward from the southern point of thc island and 10 3/4 miles southeastward from the eastern point.

A rock above water lies 1/2 mile westward of the northern point of the island (*4°09′ N., 117°39.5′ E.*). About 1 1/4 miles west-southwestward of this rock, and close offshore, are two rocks, awash, and 1/2 mile farther southwestward is a sunken rock.

Two piers, one of which is 525 feet long, with a least depth of 8 feet alongside, are situated westward of the north extremity of Oost Noenoekan; buildings are in the vicinity. A light is shown from the west pierhead.

12-125 Anchorage.—Good anchorage may be taken about 400 yards westward of the west pier in a position about 300 yards offshore. The flood current at the anchorage sets southwestward, and the ebb northeastward.

Beacons.—A pair of range beacons in range 195° are located on the northern end of Poelau Oost Noenoekan in 4°08′35″N., 117°38′40″E. (approximate). The front beacon has a daymark surmounted by a white triangle, point up, and the rear beacon a a white traingle, point down.

A similar pair of range beacons in range bearing 156° are located in 4°08′43″N., 117°38′57″E. (approximate). The intersection of this range line with that of the range beacons above, indicates the recommended anchorage in 6½ fathoms for deep draft vessels. At this anchorage Deli Berg on Pulau Sebatik is in range 109° with the northern tangent of Poelau Oost Noenoekan.

12-126 Dangers in approach.— Makasser Banks, lying 4½ to 5¼ miles south-southeastward of Steenenhoek, the southeastern point of Pulau Sebatik (see sec. 12-97), constitute the main danger in the approach. Makasser Banks were described in section 12-98.

A 2 1/2-fathom patch lies 1 1/2 miles south-southeastward of the red cliff near the southern extremity of Pulau Sebatik.

12-127 Channels.—The entrance to the main channel, with a least depth of 6 fathoms, lies between Makasser Banks and the 2 1/2-fathom pateh on the northeast, and the spit defined by the 3-fathom curve extending 10 3/4 miles southeastward from the eastern point of Poelau Oost Noenoekan on the southwest. This channel extends 18 1/2 miles northwestward from its entrance points to a point abreast the northern point of Poelau Oost Noenoekan. The channel has a width of nearly 3 miles at its southeastern entrance and 1 to 2 miles between the two islands. The least depth found in the fairway was 4 1/2 fathoms.

The channel between the northern end of Poelau Oost Noenoekan and the mouth of the Sungei Serudong is intricate and has a least depth of 7 feet northward of the north end of Oost Noenoekan. The channel between Pulau Sebatik and Sedam (Haaienbieh) Island, a triangular islet close off the northwest extremity of Pulau Sebatik, is only 300 yards wide but has a least depth of 4¼ fathoms.

A channel 2 miles wide, with a depth of 4¼ fathoms at the southern end, lies between the northwestern side of Poelau Oost Noenoekan and Poelau Tina Basan, a small island on the northeastern side of the common entrance to the Sebakis and Seboekoe rivers. This small island is separated from the coast of Borneo by Troesan Tina Basan, a narrow channel 700 yards wide, with a depth of 5 feet at its north end.

12–128 Burs Point, lying 2 miles east-northeastward of the northeastern extremity of Poelau Tina Basan, and 2 1/4 miles west-northwestward of the northern point of Poelau Oost Noenoekan, marks the southeastern point of an island formed by the two branches of the Sungei Sino Solan. The two branches, which form the northern and southern side of the island, unite and form the western side of the island at a point 6 miles west-northwestward of Burs Point. They then flow northward under the name of the Sungei Tamba into the Sungei Serudong at a point about 2 miles southwestward of Trusan Merlin. The boundary line between British and Dutch territory passes through the middle of the southern branch of the Sungei Sino Solan.

Pilotage.—See section 12–131.

12–129 Directions.—The southeastern end of the main channel should be approached by bringing the southern part of Pulau Sebatik in range with Mt. Deli Berg, located on the southwestern side of Pulau Sebatik about 2 1/2 miles southward of Mt. Antoinette, bearing 308°. This course will lead southwestward of Makasser Banks. When Steenenhoek, the southeastern point of Pulau Sebatik bears due north, the vessel should alter the course a little to the westward in order to pass about 2 miles off the southern extremity of Pulau Sebatik. A mid-channel course should then be steered between Pulau Sebatik and Poelau Oost Noenoekan.

Care should be taken when passing Makasser Banks during flood tide as the current sets directly onto the southeastern side of Pulau Sebatik.

12–130 This section has been deleted.

12–131 SOUTHEASTERN APPROACH TO THE SOENGAI SEBOEKOE.—The approach to the Soengai Seboekoe from the southeastward lies between Poelau Oost Noenoekan on the north, and three islands on the south, and is from 2 to 5 miles wide between the banks. On the outer bar northward of Poelau Ahoes, the easternmost of the three islands, there is a least depth of 3¾ fathoms in the fairway, increasing to 6 fathoms within, until about 5 miles from the entrance to the Soengai Seboekoe, where it decreases to 4¾ fathoms in mid-channel.

A vessel bound for Poelau Oost Noenoekan can request a pilot by radio through the harbor master at Tarakan, 24 hours before arrival at the outer buoy of the swept channel of Tarakan; the pilot will then board the vessel at this outer buoy which lies about 45 miles south-southeastward of the southern extremity of Poelau Oost Noenoekan.

Tandjoeng Ahoes (*3°47.5′ N., 117°50′ E.*), the eastern point of Poelau Ahoes, marks the southeastern entrance point to the channel. The trees on this point are higher than those in the near vicinity.

12–132 Off-lying dangers in approach.—Banda Reef, a coral reef, with a least depth of 5 feet and which does not show discoloration, lies 11 miles east-northeastward of Tandjoeng Ahoes.

A light buoy, painted black, marks the east side of Banda Reef.

A sunken rock, the existence of which is doubtful, is charted 21½ miles east-northeastward of Tandjoeng Ahoes. A strong swirl was observed, in 1921, in the position assigned to this rock (*3°51.5′ N., 118°11′ E.*), and native fishermen state that the rock exists.

A depth of 12 fathoms was reported (1961) about 15½ miles eastward of Tandjoeng Ahoes in position 3°45′ N., 118°05′ N. Less water than charted was reported (1956) in this area between the 20-fathom and 100-fathom curves.

12–133 Northern side of entrance channel.—The northern side of the entrance channel passes southward of the shoal spit that extends 13 miles eastward of the southern point of Poelau Oost Noenoekan within the 3-fathom curve; the inner part of this spit dries at low water to a distance of 6 miles from the southern point of the island. The southwestern side of the island is fairly steep-to.

12–134 Southern side of entrance channel.—A sand spit, that dries, extends 5 miles eastward from Tandjoeng Ahoes, and shoal water, with depths of less than 3 fathoms, extends 2 miles eastward and 5 miles southeastward from the eastern extremity of this spit. A tongue of **shoal water,** with a least depth of 1½ fathoms, fronts the northern side of Poelau Ahoes to a distance of 1 to 3¼ miles; the eastern extremity of this tongue lies 8¼ miles east-

ward of Tandjoeng Ahoes, and 3½ miles east-northeastward of the eastern extremity of the sand spit extending to the eastward from the point.

12–135 Channel.—The channel leading to the mouth of the Soengai Seboekoe is about 24 miles long in a west-northwesterly direction, and is entered between the northern side of the tongue of shoal water fronting the northern and northeastern side of Poelau Ahoes and the southern side of the shoal spit that extends 13 miles eastward of the southern point of Poelau Oost Noenoekan.

The entrance is about 4 1/2 miles wide, and has a least depth of 3 3/4 fathoms. Between the southern point of Poelau Oost Noenoekan and Poelau Boekat, the center island, the channel is 2 1/2 miles wide and has a least depth of 5 1/2 fathoms. Between Poelau Oost Noenoekan and the northwesternmost of the three islands the channel is 2 miles wide and has a least depth of 4 fathoms.

12–136 Soengai Seboekoe.—The mouth of the river is fronted by Poelau Sinedak, a narrow island with three hills, which can be seen over the surrounding low islands; the northern hill is 197 feet high and the southern hill 344 feet high. The island extends about 1½ miles southwestward from a point located about 6 miles west-southwestward from a point located about 6 miles west-southwestward of the western extremity of Poelau Oost Noenoekan. Banks, dry at low water, extend ¼ mile southwestward and westward from the island.

Sikapal and Pelanduk are steep-to wooded rocks lying about 3/4 mile northeastward and close southward, respectively, of Tandjoeng Tidoeng Salang (*4°04.7′ N., 117°28.3′ E.*), the northwestern entrance point of the river. Timbalan, a similar rock, lies close southward of Poelau Sinelak.

The channel lying to the southeastward of Poelau Sinelak appears to be deep, while that to the northwestward of the island has a depth of 3 1/2 fathoms.

A **tidal bore,** which occurs from about 3 days before to 3 days after spring tides, takes place above the village of Pangeran Anam, 32 miles upstream. The advance of the wave, which is about 3 feet in height, is rapid, and generally does considerable damage to small craft. The flood and ebb streams run at a rate of 3 1/2 knots at springs.

The village of Seboekoe is located about 46 miles from the entrance, and is accessible to small craft with local knowledge.

The Soengai Itai and the Soengai Ahoes connect with one another between the northwestern end of Poelau Ahoes and the southeastern side of Poelau Boekat; the Itai thence flows westward and northwestward and connects with the Soengai Seboekoe about 3 1/4 miles above Poelau Sinelak. A shallow bar, clear of rocks, lies at the junction of the Itai and Ahoes. This bar is named Muara Bukat. The land in the vicinity of these rivers is swampy and wooded.

12–137 Rivers.—The Soengai Simengaris and the Soengai Sebakis flow into a common mouth, about 2 1/2 miles wide, on the northern and southern sides respectively, of Tandjoeng Bakis, located about 3 3/4 miles west-northwestward of Tandjoeng Tidoeng Salang. Neither river is of any importance, and each becomes very narrow about 6 miles above the entrance point.

Small craft with local knowledge can ascend the Simengaris 14 miles from the mouth to the village of the same name.

12–138 Coast—Tandjoeng Ahoes to the southward.—A full description of this part of the coast of Borneo is given in H. O. Pub. No. 72.

APPENDIX I

List of principal ports showing particulars of depths

Port	Depths below chart datum plane			Tidal Rise	
	In channel of approach	At anchorage	At wharves	Springs	Neaps
			Feet	*Feet*	*Feet*
Christmas Island (Flying Fish Cove)	Deep	No anchorage	25 to 28	5.3	4.3
Cocos Islands (Port Refuge)	Deep	(Outer anchorage) 7 to 8 fathoms (Inner anchorage) 8 to 11 fathoms		3.5	2.9
Jesselton	6 fathoms	8 fathoms	18 to 25	5.1	3.4
Klabat Baai	3¼ fathoms	3 to 6 fathoms		7.7	
Kuching	2¾ fathoms	(Kuap anchorage) 4½ fathoms	17 to 19	13.0	12.5
Kudat	6 to 9 fathoms	6½ fathoms	16	7.1	5.2
Muntok	5 fathoms	5½ to 11 fathoms		9.2	
Oosthaven	6½ fathoms	5 to 7 fathoms	26 to 33	4.2	3.2
Palembang	(Outer bar) 10.8 feet	19 to 33 feet	11 to 28	(Outer bar) 9.5	
Pangkalpinang	3 to 10 fathoms	3 to 4 fathoms		7.3	
Pontianak	(Outer bar) 10 feet	8½ to 10 fathoms	4 to 13	(Outer bar) 4.2	
Sandakan	4 fathoms	7 fathoms	21	5.9	3.8
Tandjoeng Pandan	Deep	(Outer anchorage) 6 to 8 fathoms (Inner anchorage) 3¼ fathoms		6.1	
Tandjungpriok	31 feet	(New roadstead) 5½ to 6½ fathoms (Old roadstead) 5 to 6 fathoms	12 to 32	2.9	
Victoria Harbor	5½ fathoms	5½ to 8 fathoms	17 to 31	6.9	5.2

APPENDIX II — METEOROLOGICAL TABLES

(U. S. Weather Bureau, Department of Commerce)

STATION BANDOENG, JAVA.—*Position: Lat. 6°54′ S., long. 107°35′ E., altitude, 2,428 feet*

Month	Air temperature °F.					Relative humidity %			Cloud amount (0–10)		Rainfall			Wind												Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms
	Mean			Extreme										Mean velocity (knots)	Maximum velocity (knots)	Percentage of observations from												
	Monthly	Maximum	Minimum	Maximum	Minimum	Bi-Hourly	0600	1400			Average amount (inches)	Number of days with rain (.02 ins)	Maximum in 24-hours (inches)			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January	72	81	67	90	59	84	90	65	.....	.....	7.83	16.3	3.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24
February	72	80	67	88	60	86	90	66	.....	.....	7.13	16.5	3.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24
March	72	81	67	90	59	85	90	66	.....	.....	9.45	17.3	5.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	23
April	73	82	67	87	57	84	91	64	.....	.....	8.94	16.5	4.6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22
May	73	82	66	86	57	83	90	61	.....	.....	5.47	10.3	3.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20
June	72	82	64	87	53	81	89	57	.....	.....	3.58	8.4	2.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	10
July	72	82	63	87	52	77	88	51	.....	.....	2.44	5.4	3.5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	5
August	72	83	63	88	53	75	87	48	.....	.....	2.32	4.7	3.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	12
September	73	84	64	91	53	75	87	49	.....	.....	3.35	7.2	3.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	11
October	73	84	65	94	57	78	89	56	.....	.....	6.61	11.3	3.0	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	21
November	72	82	66	93	55	83	89	63	.....	.....	9.29	16.7	3.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	22
December	72	81	67	88	59	84	89	65	.....	.....	9.09	15.7	4.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	24
Mean	72	82	65	.....	.....	81	89	59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75.50	146.3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	218
Extreme	.....	.....	.....	94	52	.....	.....	.....	.....	.....	.....	.....	5.1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Number of years	22	22	22	22	22	7	22	22	.....	.....	50	44	49–50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	4

DJAKARTA

STATION (BATAVIA,) JAVA.—*Position: Lat. 6°11′ S., long. 106°50′ E., altitude, 26 feet*

Month	Air temperature °F.					Relative humidity %			Cloud amount (0–10)		Rainfall			Wind												Average number of days with fog	Average number of days with sales	Average number of days with thunderstorms
	Mean			Extreme										Mean velocity (knots)	Maximum velocity (knots)	Percentage of observations from												
	Monthly	Maximum	Minimum	Maximum	Minimum	Bi-Hourly	0600	1400	0700	1300	Average amount (inches)	Number of days with rain	Maximum in 24-hours (inches)			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January	78	84	74	92	69	88	95	75	7.8	7.8	12.01	20	11.26	1.74	15.54	13	4	1	4	7	8	18	18	27	.....	.....	13
February	78	84	74	91	69	88	95	76	7.8	7.8	12.60	19	7.68	1.74	16.67	13	5	2	4	6	8	14	18	30	.....	.....	12
March	79	85	74	92	69	88	95	73	6.5	7.0	8.35	16	5.79	1.74	18.50	12	7	5	7	9	8	13	11	28	.....	.....	14
April	80	86	75	92	69	85	94	71	5.7	6.4	5.47	12	7.56	1.74	15.54	10	14	10	11	11	6	5	4	29	.....	.....	14
May	80	87	75	92	70	84	94	69	5.2	6.0	4.25	9	3.74	1.56	13.63	9	16	13	13	9	4	4	2	30	.....	.....	11
June	79	86	74	92	67	84	94	68	4.9	5.8	3.58	8	5.31	1.56	13.98	9	17	15	14	9	2	2	2	30	.....	.....	8
July	79	86	73	92	67	81	92	65	4.5	5.3	2.64	6	4.53	1.74	13.20	10	18	16	15	10	2	1	2	26	.....	.....	6
August	79	87	73	94	67	79	91	62	4.4	5.3	1.69	4	3.31	2.17	17.11	12	19	15	15	11	2	1	2	23	.....	.....	3
September	80	88	73	96	66	78	90	62	4.6	5.3	2.72	6	5.16	2.17	18.50	17	16	10	13	12	3	2	3	24	.....	.....	12
October	80	88	74	96	69	80	91	65	5.2	6.0	4.68	9	6.42	1.91	19.97	17	14	8	10	14	5	3	3	26	.....	.....	16
November	79	87	74	95	68	83	93	69	6.3	7.0	5.63	13	5.00	1.74	17.28	15	8	5	8	15	9	8	6	26	.....	.....	13
December	79	85	74	93	67	85	94	73	7.1	7.8	7.83	16	6.26	1.74	16.50	11	5	3	5	10	11	17	12	26	.....	.....	13
Mean	79	86	74	.....	.....	84	93	69	5.8	6.5	.....	.....	.....	1.80	.....	12	12	9	10	10	6	7	7	27	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	71.45	138	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	131
Extreme	.....	.....	.....	96	66	.....	.....	.....	.....	.....	.....	.....	11.26	.....	19.97	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Number of years	70	70	70	70	70	53	70	70	39	39	50	50	51	56	66	35	35	35	35	35	35	35	35	35	.....	.....	52

STATION BEAUFORT, BR. NO. BORNEO.—*Position: Lat. 5°20′ N., long. 115°49′ E.*

Month	Air temperature °F. Mean: Monthly	Mean: Maximum	Mean: Minimum	Extreme: Maximum	Extreme: Minimum	Relative humidity %		Cloud amount (0–10)		Rainfall: Average amount (inches)	Rainfall: Number of days with rain (≥.04 ins.)	Rainfall: Maximum in 24 hours (inches)	Wind: Mean velocity (knots)	Wind: Maximum velocity (knots)	Wind: Percentage of observations from: North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Average number of days with fog	Average number of days with gales
January	80.8	88.7	72.8	97	67					13.20	15.8	8.30													
February	81.2	89.2	73.1	98	69					9.22	11.4	9.80													
March	82.2	90.7	73.7	98	68					10.00	12.9	3.81													
April	82.6	91.2	74.0	99	70					13.81	16.2	4.18													
May	82.6	91.2	74.1	95	71					14.72	15.0	5.11													
June	82.4	91.0	73.9	96	70					11.78	12.2	5.53													
July	82.2	90.6	73.7	97	70					11.60	12.6	4.00													
August	82.2	91.0	73.5	97	70					11.14	13.7	4.11													
September	82.1	90.8	73.4	96	69					15.31	17.6	4.93													
October	82.0	90.3	73.6	98	70					16.37	18.7	4.31													
November	81.6	90.0	73.2	96	68					14.29	16.9	7.00													
December	81.2	89.3	73.0	95	69					13.19	17.3	4.05													
Mean	81.9	90.3	73.5																						
Total										154.63	180.3														
Extreme				99	67							9.80													
Number of years	13	13	13	12	12					12	12	12													

STATION BUITENZORG, JAVA.—*Position: Lat. 6°36′ S., long. 106°48′ E., altitude 787 feet*

Month	Air temperature °F. Mean: Monthly	Mean: Maximum	Mean: Minimum	Extreme: Maximum	Extreme: Minimum	Relative humidity %: Mean	0600	1400	Cloud amount (0–10): 0800	1200	Rainfall: Average amount (inches)	Number of days with rain	Maximum in 24 hours (inches)	Wind: Mean velocity (knots)	Maximum velocity (knots)	Percentage of observations from: North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms
January	76	84	71	90	67	85	93	76	7.9	8.1	16.6	23.6	5.67	2.17													28.2
February	76	84	71	91	66	86	93	76	7.8	8.1	15.4	22.3	5.31	2.17													26.0
March	76	85	71	90	66	85	92	75	6.5	7.1	15.4	23.1	6.57	2.52													29.8
April	77	86	72	92	63	83	91	70	5.3	6.3	15.5	20.1	5.08	2.69													27.2
May	78	87	72	91	64	82	91	66	4.4	5.8	14.2	16.5	7.28	2.34													25.5
June	77	86	71	91	63	80	91	62	4.0	5.2	10.4	13.0	6.85	2.34													23.5
July	77	86	70	92	64	77	89	56	3.1	4.6	9.4	11.5	8.66	2.69													21.7
August	77	87	70	92	64	76	89	54	3.1	4.6	9.6	11.8	5.51	2.69													22.3
September	78	88	71	95	63	76	88	53	3.6	4.9	12.5	14.0	10.24	2.69													25.5
October	78	87	71	94	67	79	88	60	5.0	5.9	17.0	18.7	6.93	3.13													28.3
November	77	87	72	93	65	81	89	68	5.6	6.7	15.7	20.9	5.28	2.69													26.6
December	77	85	72	92	66	82	90	73	7.0	7.9	13.6	21.6	4.61	2.52													29.8
Mean	77	86	71			81	90	66	5.3	6.3				2.55													
Total											165.5	217.1															311.4
Extreme				95	63								10.24														
Number of years	22	22	22	22	22	22	22	22	7	7	50	50	51	8													6

STATION CHRISTMAS ISLAND.—*Position: Lat. 10°25′ S., long. 105°43′ E., altitude 20 feet*

Month	Air temperature °F.					Relative humidity %		Cloud amount (0–10)		Rainfall			Wind											Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms
	Mean			Extreme											Percentage of observations from											
	Monthly	Maximum	Minimum	Maximum	Minimum				Mean of 2 obs	Average amount (inches)	Number of days with rain	Maximum in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January	81	88	75	94	68	.....	85	.....	4.2	8.8	14	11.5	4.08	.....	1	1	5	14	10	14	15	7	33	0	0.2	.....
February	81	87	76	94	71	.....	88	.....	4.7	13.1	18	9.0	4.69	.....	2	3	6	13	4	11	18	12	31	0	0.1	.....
March	82	87	76	95	70	.....	86	.....	4.7	10.5	20	6.5	5.64	.....	2	3	13	12	4	8	13	11	34	0	0.1	.....
April	82	88	76	94	71	.....	89	.....	4.4	7.9	19	15.2	4.78	.....	2	5	28	21	1	2	3	3	35	0	0	.....
May	82	88	76	93	70	.....	83	.....	4.3	9.2	17	7.6	5.47	.....	1	5	33	28	1	1	1	2	30	0	0	.....
June	80	86	75	92	69	.....	86	.....	4.0	6.1	15	8.5	5.21	.....	1	5	38	28	0	0	1	1	28	0	0	.....
July	80	86	73	92	67	.....	84	.....	3.9	4.9	15	5.9	5.04	.....	2	5	38	32	0	0	0	1	22	0	0	.....
August	80	86	73	90	67	.....	80	.....	3.8	2.3	10	2.4	5.30	.....	0	3	42	36	1	0	0	0	18	0	0	.....
September	80	87	73	91	67	.....	78	.....	4.1	3.2	9	6.5	5.04	.....	1	2	37	43	0	0	0	1	16	0	0	.....
October	81	87	74	94	67	.....	76	.....	3.8	3.2	9	5.6	5.38	.....	1	2	27	51	1	1	0	0	17	0	0	.....
November	81	87	75	94	68	.....	80	.....	4.7	9.3	11	7.1	4.69	.....	1	3	17	43	3	2	2	2	27	0	0	.....
December	81	87	75	94	69	.....	83	.....	4.6	8.5	14	8.0	4.52	.....	2	3	8	27	7	10	7	5	31	0	0	.....
Mean	81	87	75	.....	.....	.....	84	.....	4.3	.....	.....	.....	4.99	.....	1	3	24	29	3	4	5	4	27	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....	.....	.....	87.0	171	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	0	0.4	.....
Extreme	.....	.....	.....	95	67	.....	.....	.....	.....	.....	.....	15.2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Number of years	35	35	35	36–37	36–37	.....	36–37	.....	15	15	36	36	15	.....	36	36	30	36	36	36	36	36	36	24	24	.....

STATION JESSELTON, BR. NO. BORNEO.—*Position: Lat. 5°58′ N., long. 116°04′ E., altitude 23 feet*

Month	Air temperature °F.					Relative humidity %		Cloud amount (0–10)		Rainfall			Wind											Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms
	Mean			Extreme											Percentage of observations from											
	Monthly	Maximum	Minimum	Maximum	Minimum					Average amount (inches)	Number of days with rain (≥ .01 ins)	Maximum in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January	79	86	71	92	64	.....	.....	.....	.....	6.26	12	4.45	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
February	79	86	71	93	62	.....	.....	.....	.....	2.76	7	2.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
March	79	87	71	93	64	.....	.....	.....	.....	3.43	9	2.28	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
April	80	88	72	93	64	.....	.....	.....	.....	5.67	11	3.54	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
May	81	89	72	97	65	.....	.....	.....	.....	10.00	14	4.84	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
June	80	88	72	94	65	.....	.....	.....	.....	11.33	15	5.59	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
July	80	88	71	93	63	.....	.....	.....	.....	9.65	13	3.62	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
August	80	89	71	94	61	.....	.....	.....	.....	8.82	13	11.65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
September	79	88	71	92	62	.....	.....	.....	.....	12.68	17	5.98	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
October	79	87	71	92	67	.....	.....	.....	.....	15.94	19	7.01	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
November	79	87	71	94	65	.....	.....	.....	.....	12.24	17	5.55	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
December	79	86	71	92	64	.....	.....	.....	.....	11.50	16	5.67	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean	79	87	71	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....	.....	.....	110.28	163	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Extreme	.....	.....	.....	98	61	.....	.....	.....	.....	.....	.....	11.65	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Number of years	20	20	20	23	23	.....	.....	.....	.....	20	21	12–14	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

STATION KUDAT, BR. NO. BORNEO.—*Position: Lat. 6°53′ N., long. 116° 115°08′ E.*

Month	Air temperature °F.					Relative humidity %		Cloud amount (0–10)		Rainfall			Wind										Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms
	Mean			Extreme											Percentage of observations from										
	Monthly	Maximum	Minimum	Maximum	Minimum	0900	1800	0900	1500	Average amount (inches)	Number of days with rain (≧ 0.04 ins)	Maximum in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January	80	86	74	93	65	-----	-----	2.4	2.9	14.41	18.0	7.10	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
February	80	87	74	92	62	-----	-----	2.8	2.7	8.31	10.9	4.68	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
March	82	89	75	94	65	-----	-----	2.3	3.3	5.75	11.1	4.00	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
April	83	91	75	96	63	-----	-----	2.3	3.4	2.48	8.0	2.13	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
May	84	91	76	96	65	-----	-----	1.9	3.9	4.61	7.7	3.24	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
June	83	91	75	95	65	-----	-----	3.4	4.2	6.10	8.9	1.95	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
July	82	90	74	96	65	-----	-----	4.5	5.2	5.20	8.4	3.62	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
August	82	90	75	95	67	-----	-----	4.5	6.3	5.28	9.7	3.96	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
September	82	90	74	96	65	-----	-----	5.4	6.5	5.63	11.6	2.43	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
October	81	89	74	94	66	-----	-----	6.2	6.8	8.94	15.4	3.35	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
November	81	88	75	94	68	-----	-----	7.4	7.7	12.05	16.0	3.84	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
December	80	87	74	94	66	-----	-----	6.9	7.4	17.91	19.4	7.60	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Mean	82	89	74	-----	-----	-----	-----	4.3	5.0	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Total	-----	-----	-----	-----	-----	-----	-----	-----	-----	96.67	145.1	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Extreme	-----	-----	-----	96	62	-----	-----	-----	-----	-----	-----	7.60	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Number of years	12–13	13–15	11–13	12–14	10–13	-----	-----	1	1	15	10–11	11	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

STATION LABUAN, ~~STR. SETTLEMENTS.~~—*Position: Lat. 5°15′ N., long. 115°08′ E.*

Month	Air temperature °F.					Relative humidity %		Cloud amount (0–10)		Rainfall			Wind										Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms
	Mean			Extreme											Percentage of observations from										
	Monthly	Maximum	Minimum	Maximum	Minimum	0900	1800	0900	1800	Average amount (inches)	Number of days with rain (≧ .01 ins)	Maximum in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January	82	86	76	92	68	81	76	5.9	6.4	7.20	12	5.12	-----	-----	18	48	5	2	6	8	1	7	5	0	-----	-----
February	82	86	76	92	68	82	76	6.1	6.1	5.47	9	12.40	-----	-----	27	46	4	3	2	7	‡	6	5	0	-----	3
March	82	87	76	93	63	82	75	6.0	6.2	5.63	10	3.58	-----	-----	25	36	3	4	3	8	1	15	5	0	-----	3
April	83	89	76	95	60	82	74	5.9	6.0	8.90	14	5.71	-----	-----	19	22	3	3	7	22	5	15	4	0	-----	3
May	84	89	76	96	59	82	74	6.1	6.4	12.13	16	6.50	-----	-----	17	23	4	3	10	25	3	10	4	0	-----	6
June	83	88	76	94	60	82	74	6.1	6.1	12.13	15	7.99	-----	-----	21	20	3	5	11	25	4	4	6	0	-----	5
July	83	88	77	93	68	83	73	6.1	6.1	9.96	13	6.89	-----	-----	16	14	4	5	13	33	4	8	3	0	-----	5
August	83	88	76	94	68	82	73	6.2	6.8	10.55	14	5.00	-----	-----	17	12	3	5	12	31	6	12	2	0	-----	5
September	82	87	76	93	64	82	74	6.4	6.6	15.20	17	14.49	-----	-----	14	14	1	3	11	28	5	12	14	0	-----	6
October	82	87	76	94	63	82	75	6.6	6.5	15.91	20	6.30	-----	-----	8	16	2	3	11	28	7	15	12	0	-----	5
November	82	87	76	93	69	82	76	6.1	6.2	14.92	17	10.59	-----	-----	8	25	4	4	9	22	6	12	10	0	-----	6
December	82	86	76	93	69	82	77	6.2	6.4	12.72	17	4.88	-----	-----	14	37	2	5	11	17	3	7	4	0	-----	4
Mean	83	87	76	-----	-----	82	75	6.1	6.3	-----	-----	-----	-----	-----	17	28	3	4	9	21	4	10	6	-----	-----	-----
Total	-----	-----	-----	-----	-----	-----	-----	-----	-----	130.72	174	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	0	-----	61
Extreme	-----	-----	-----	96	59	-----	-----	-----	-----	-----	-----	14.49	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Number of years	21	21	21	20	20	16–17	16–17	8	8	22	21	21	-----	-----	9	9	9	9	9	9	9	9	9	8	-----	9

‡Less than 0.5%

STATION MANGGAR, BILLITON IS.—*Position: Lat. 2°52′ S., long. 108°16′ E., altitude 16 feet*

Month	Air temperature °F.					Relative humidity %		Cloud amount (0–10)		Rainfall			Wind											Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms
	Mean			Extreme											Percentage of observations from											
	Monthly	Maximum	Minimum	Maximum	Minimum	0600	1200			Average amount (inches)	Number of days with rain	Maximum in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January	79.2	84.0	74.5	90	69	93	76			12.13	18.7															
February	79.6	85.1	74.1	91	70	92	70			8.15	13.0															
March	80.2	86.2	74.1	91	71	92	70			10.43	16.3															
April	80.8	86.7	74.8	94	71	91	69			9.06	15.0															
May	81.3	86.7	75.9	93	72	89	70			10.04	15.1															
June	81.4	86.2	76.6	92	71	85	69			7.91	11.4															
July	81.8	85.8	77.9	90	71	82	67			6.69	9.5															
August	81.8	86.0	77.5	89	69	82	65			5.08	7.0															
September	81.8	86.5	77.2	90	68	84	66			4.06	6.1															
October	81.4	87.1	75.7	91	70	87	67			6.30	11.1															
November	80.4	86.4	74.3	93	71	92	71			9.80	16.4															
December	79.7	84.9	74.5	92	72	91	75			13.94	21.4															
Mean	80.8	86.0	75.6			88	70																			
Total										103.59	161.9															
Extreme				94	68																					
Number of years	6	6	6	6	6	6	6			49	49															

STATION PALEMBANG, SUMATRA.—*Position: Lat. 2°54′ S., long. 104°42′ E., altitude 33 feet*

Month	Air temperature °F.					Relative humidity %		Cloud amount (0–10)		Rainfall			Wind											Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms
	Mean			Extreme											Percentage of observations from											
	Monthly	Maximum	Minimum	Maximum	Minimum					Average amount (inches)	Number of days with rain	Maximum in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January										11.54	19.1															6
February										9.61	15.9															7
March										12.24	17.9															13
April										11.18	15.9															14
May										7.44	12.2															10
June										4.76	9.1															8
July										3.78	7.4															9
August										4.29	8.3															7
September										4.57	8.3															6
October										8.11	12.0															12
November										10.75	16.2															14
December										13.03	19.7															9
Mean																										
Total										101.30	162.0															114
Extreme																										
Number of years										50	50															8

STATION PONTIANAK, BORNEO.—*Position: Lat. 0°01′ S., long. 109°20′ E., altitude 10 feet*

Month	Air temperature °F. Mean: Monthly	Mean: Maximum	Mean: Minimum	Extreme: Maximum	Extreme: Minimum	Relative humidity %: 0600	1200	Bi-Hourly	Cloud amount (0-10): 0700	1200	Rainfall: Average amount (inches)	Number of days with rain	Maximum in 24-hours (inches)	Wind: Mean velocity (knots)	Maximum velocity (knots)	Percentage of observations from: North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms
January	79	87	74	94	69	93	67	86	4.2	4.2	11.06	16	2.7													5.2
February	80	89	76	94	69	93	65	86	5.6	4.6	8.23	13	2.3													5.7
March	80	89	74	96	68	93	64	87	6.0	5.5	9.41	14	2.6													8.8
April	80	89	75	95	71	93	66	88	5.2	5.2	11.18	16	2.5													9.1
May	81	90	75	96	70	94	66	87	4.7	4.9	11.18	16	2.7													6.6
June	81	90	75	96	70	93	66	87	5.2	4.8	8.82	13	2.6													5.6
July	80	89	74	94	68	93	63	86	4.6	4.5	6.69	10	2.2													3.7
August	81	90	74	95	69	93	63	86	4.9	4.3	8.23	12	2.3													5.2
September	80	90	75	95	69	93	65	87	4.8	5.2	9.09	13	2.4													6.6
October	80	88	75	95	71	93	68	89	5.2	5.6	14.65	19	3.0													7.9
November	79	88	75	94	70	93	68	89	4.8	5.2	15.67	20	3.0													6.4
December	79	87	74	93	70	93	69	89	5.2	5.6	12.91	19	2.7													2.0
Mean	80	89	75	----	----	93	65	87	5.0	5.0	----	----	----													
Total	----	----	----	----	----	----	----	----	----	----	127.12	181	----													
Extreme	----	----	----	96	68	----	----	----	----	----	----	----	3.0													72.8
Number of years	20	20	20	20	20	19	19	7	3-4	3-4	59-60	50	58													4

STATION SANDAKAN, BR. NO. BORNEO.—*Position: Lat. 5°50′ N., long. 118°07′ E., altitude 152 feet*

Month	Air temperature °F. Mean: Monthly	Mean: Maximum	Mean: Minimum	Extreme: Maximum	Extreme: Minimum	Relative humidity %: Mean: Mean of 3 obs.	0900	1500	Cloud amount (0-10): Mean: Mean of 3 obs.	0900	1500	Rainfall: Average amount (inches)	Number of days with rain	Maximum in 24-hours (inches)	Wind: Mean velocity (knots)	Maximum velocity (knots)	Percentage of observations from: North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms	Average number of cloudy days
January	80	85	74	91	70	82	84	76	6.0	6.2	5.6	19.0	19	14.5	----	----	17	22	6	1	3	6	5	13	27	0	0	----	15
February	80	86	74	91	70	81	80	73	4.6	5.5	4.6	10.9	13	7.8	----	----	9	18	4	2	2	6	1	12	47	0	0	----	12
March	81	87	75	94	71	79	79	70	4.0	4.8	3.8	8.6	13	6.6	----	----	10	18	2	3	2	6	2	6	50	0	0	----	16
April	82	89	76	95	70	77	77	68	3.9	3.9	4.5	4.5	10	4.5	----	----	11	17	2	5	6	11	7	9	32	0	0	----	9
May	82	89	76	95	72	78	80	72	3.9	3.6	4.8	6.2	11	5.5	----	----	4	10	6	12	11	27	10	3	17	0	0	----	7
June	82	89	75	99	71	79	79	74	4.4	3.8	4.5	7.4	14	4.7	----	----	1	7	4	14	17	27	7	4	19	0	0	----	11
July	82	89	75	96	70	78	78	67	4.7	4.2	4.7	6.7	14	3.5	----	----	2	6	4	13	19	25	7	3	21	0	0	----	14
August	82	89	75	95	71	78	80	68	4.9	4.3	5.5	7.9	14	3.9	----	----	2	6	5	10	14	25	9	2	27	0	0	----	8
September	82	89	76	97	70	78	78	66	5.3	4.2	4.8	9.3	14	4.8	----	----	3	4	3	7	18	22	10	2	31	0	0	----	14
October	81	88	75	94	70	79	78	71	4.3	3.8	4.5	10.2	16	5.6	----	----	7	7	3	6	14	14	7	4	38	0	0	----	15
November	81	87	75	93	71	81	80	73	5.4	5.0	5.3	14.5	19	5.1	----	----	8	8	3	4	8	11	10	8	40	0	0	----	16
December	80	86	74	92	71	82	82	76	5.3	5.0	5.2	18.5	20	12.5	----	----	11	12	3	4	5	9	10	9	36	0.3	0	----	16
Mean	81	88	75	----	----	79	----	----	4.7	----	----	----	----	----	----	----	7	11	4	7	10	16	7	6	32	----	----	----	----
Total	----	----	----	----	----	----	----	----	----	----	----	123.7	177	----	----	----	----	----	----	----	----	----	----	----	----	0.3	0	----	----
Extreme	----	----	----	99	70	----	----	----	----	----	----	----	----	14.5	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Number of years	45	45	45	32	32	24	5-6	5-6	8	5-6	5-6	46-47	43	28	----	----	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	2-3	3	2-3	----	4-5

STATION TANDJOENGPANDAN, BILLITON IS.—*Position: Lat. 2°45′ S., long. 107°38′ E., altitude 10 feet*

Month	Air temperature °F.					Relative humidity %		Cloud amount (0–10)		Rainfall			Wind											Average number of days with fog	Average number of days with gales
	Mean			Extreme											Percentage of observations from										
	Monthly	Maximum	Minimum	Maximum	Minimum	0600	1200			Average amount (inches)	Number of rainy days (≥.02 ins)	Maximum in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm		
January	79.0	83.1	75.0	89	70	89	78			11.18	16.6														
February	79.2	83.7	74.8	87	71	92	75			6.55	12.2														
March	79.4	84.6	74.3	89	71	95	75			7.80	14.1														
April	79.9	85.2	73.6	91	71	97	74			10.65	18.4														
May	80.4	86.7	74.1	91	71	97	72			9.53	17.7														
June	79.9	86.4	73.4	91	69	97	70			7.17	14.5														
July	79.8	86.9	72.7	92	67	96	67			6.85	11.8														
August	79.8	87.6	72.1	92	68	95	69			5.67	10.8														
September	80.0	87.8	72.3	94	66	96	61			6.81	11.6														
October	80.0	87.1	72.9	93	66	96	69			10.55	17.2														
November	79.0	84.7	73.2	92	68	95	77			14.33	21.6														
December	79.1	83.7	74.5	89	69	92	79			16.61	22.3														
Mean	79.6	85.6	73.6			95	71																		
Total										113.70	188.8														
Extreme				94	66																				
Number of years	6	6	6	6	6	6	6			50	44														

STATION TAWAU, BR. NO. BORNEO.—*Position: Lat. 4°14′ N., long. 118°03′ E.*

Month	Air temperature °F.					Relative humidity %		Cloud amount (0–10)		Rainfall			Wind											Average number of days with fog	Average number of days with gales	Average number of days with thunderstorms
	Mean			Extreme											Percentage of observations from										
	Monthly	Maximum	Minimum	Maximum	Minimum					Average amount (inches)	Number of days with rain (≥0.04 ins.)	Maximum in 24-hours (inches)	Mean velocity (knots)	Maximum velocity (knots)	North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm			
January	79.5	88.5	70.5	94	61					4.89	10.6	2.30													
February	79.8	89.0	70.7	96	65					5.18	8.1	2.83													
March	80.0	89.3	70.8	95	66					5.34	10.9	2.64													
April	80.6	89.7	71.5	94	66					5.73	9.1	5.04													
May	80.3	89.3	71.3	94	67					8.64	11.4	4.50													
June	79.7	88.4	71.0	94	64					7.71	10.6	5.53													
July	79.8	88.6	71.0	95	67					9.23	11.8	4.35													
August	79.8	88.3	71.2	93	65					9.16	11.3	4.76													
September	80.2	89.3	71.2	97	65					5.63	9.9	3.00													
October	80.4	89.8	71.1	95	66					5.79	10.7	2.47													
November	80.0	89.2	70.9	93	68					7.20	10.4	2.85													
December	79.9	89.1	70.7	95	65					7.07	11.2	3.50													
Mean	80.4	89.0	71.0																						
Total										81.57	126.5														
Extreme				97	61							5.53													
Number of years	13	13	13	12	12					11	11	11													

OCEAN AREA.—*Position: 00°–05° N., 105°–110° E., years covered, 1879–1934*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind: Mean velocity (knots)	Wind: Percentages of observations from North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Weather: Percentages of observations recording Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
January	232	10.6	39	45	3	0	1	1	2	7	2	4	0	0	0	5	0	9	0	9	0	0	12	5.9	.....	78.6
February	226	8.9	38	39	5	2	1	2	1	8	4	2	0	0	0	3	0	7	0	5	1	0	12	5.0	.....	79.2
March	338	5.7	23	39	7	4	2	2	4	6	13	3	1	0	1	4	0	2	3	3	0	0	8	4.4	.....	80.6
April	373	4.3	13	22	10	10	15	8	6	6	10	3	1	0	0	2	0	4	7	7	0	0	9	4.4	.....	83.3
May	390	4.6	5	9	14	18	24	17	3	4	6	2	1	0	1	3	0	4	7	3	0	0	11	4.9	.....	84.2
June	351	7.2	2	4	7	17	35	22	6	3	4	2	1	0	1	6	0	6	2	6	0	1	8	4.9	.....	84.0
July	327	8.9	2	2	3	10	45	18	5	3	3	5	1	0	1	5	0	2	6	3	0	0	9	5.1	.....	83.3
August	353	8.9	0	1	5	23	43	21	3	2	1	4	2	0	1	5	0	5	3	3	0	0	8	4.9	.....	82.9
September	293	7.6	0	6	4	15	40	25	4	2	4	6	1	0	1	5	0	4	5	4	0	0	9	5.1	.....	83.1
October	356	6.0	11	9	7	9	19	19	10	8	8	6	2	1	0	5	0	6	6	10	0	1	8	5.2	.....	82.9
November	272	6.5	18	12	6	6	8	16	11	16	7	4	2	0	0	8	0	5	2	5	0	0	7	5.9	.....	82.4
December	311	9.7	39	30	5	2	4	5	3	8	4	4	0	0	2	10	0	8	1	9	0	1	5	5.9	.....	80.4
Mean	.....	7.4	16	18	6	10	20	13	5	6	6	4	1	*	1	5	0	5	4	6	*	*	9	5.1	.....	82.1
Total	3,782	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Less than 0.5 percent.

OCEAN AREA.—*Position: 00°–05° N., 110°–115° E., years covered, 1879–1933*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind: Mean velocity (knots)	Wind: Percentages of observations from North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Weather: Percentages of observations recording Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
January	59	9.3	22	52	4	2	2	0	4	12	2	0	0	0	0	0	0	10	5	9	0	0	3	6.2	80.7	80.9
February	62	11.1	43	45	0	0	2	0	2	5	0	5	2	0	2	8	0	4	5	6	0	0	2	5.2	80.6	80.8
March	49	7.2	22	58	2	0	0	2	7	4	5	4	0	0	4	6	0	12	6	4	0	0	19	5.1	81.6	82.0
April	34	4.9	27	11	11	8	4	11	7	14	7	3	0	0	0	3	0	12	6	6	0	0	6	5.1	83.3	83.4
May	45	3.9	4	15	9	5	13	27	10	7	10	2	0	0	0	3	0	8	7	7	0	0	11	5.3	83.8	84.4
June	31	5.3	0	0	10	6	20	26	18	13	7	0	0	0	0	2	0	8	10	9	0	0	6	5.6	83.3	84.0
July	40	6.0	13	6	8	3	5	44	8	13	0	5	0	0	0	3	0	8	10	5	0	0	25	4.6	83.8	83.8
August	44	8.4	0	2	5	26	10	39	12	15	0	9	5	0	2	0	0	2	0	5	0	0	11	5.0	82.7	82.1
September	42	7.2	10	0	7	3	13	39	20	10	7	5	0	0	2	12	0	5	7	5	0	0	5	5.5	81.8	82.4
October	62	4.9	10	10	6	2	12	23	8	17	12	10	0	0	2	2	0	2	3	5	0	0	8	5.3	82.7	83.2
November	53	5.7	21	12	2	4	6	22	11	15	7	9	2	0	0	4	0	4	0	5	0	0	8	5.5	83.1	83.5
December	52	8.0	18	38	0	6	10	4	2	18	4	0	0	0	0	14	0	12	0	0	0	0	14	5.7	80.8	81.8
Mean	.....	6.8	16	21	5	6	8	18	9	12	5	4	1	0	1	5	0	7	4	3	0	*	10	5.3	82.4	82.7
Total	573	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Less than 0.5 percent.

OCEAN AREA.—*Position: 00°–05° N., 115°–120° E., years covered, 1879–1933*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind										Weather													
		Mean velocity (knots)	Percentages of observations from									Percentages of observations recording											Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility			
January	29	5.3	25	7	4	10	3	4	25	15	7	0	0	0	3	7	0	14	3	3	0	0	17	6.0	81.4	81.6
February	28	6.0	35	23	16	11	0	8	0	7	0	11	0	0	0	0	0	0	7	0	0	0	14	5.2	81.8	82.2
March	38	6.7	15	40	6	9	6	6	3	9	6	0	0	0	0	3	0	8	11	11	0	0	13	4.7	81.3	82.7
April	50	4.9	16	29	8	11	16	8	5	5	2	2	0	0	0	12	0	2	10	10	0	0	10	4.4	83.2	83.8
May	55	3.9	2	18	11	13	15	24	2	0	15	2	0	0	0	7	0	9	4	4	0	0	11	4.7	84.7	83.6
June	55	4.9	2	6	20	28	18	14	4	0	8	0	0	0	2	2	0	5	2	2	0	0	11	4.4	83.6	83.8
July	60	6.8	2	2	2	13	48	24	2	0	7	3	2	0	0	7	0	3	5	5	0	0	12	5.4	82.8	82.3
August	40	7.2	1	2	3	12	41	30	3	5	3	5	0	0	3	5	0	5	5	0	0	0	18	4.5	82.3	82.6
September	40	8.0	2	2	3	10	29	41	5	3	5	5	0	0	0	5	0	3	8	8	3	0	3	5.2	82.3	82.2
October	74	4.6	15	13	6	1	16	22	10	4	13	5	0	1	0	5	0	5	7	7	0	0	9	4.3	82.5	82.7
November	53	4.8	23	16	4	5	21	7	5	10	9	4	0	0	0	2	0	2	19	0	0	0	4	5.0	82.1	82.9
December	39	6.0	26	22	6	6	3	6	13	12	6	0	0	0	3	3	0	13	0	5	3	0	3	5.2	81.9	83.0
Mean	-----	5.7	14	15	7	11	18	16	6	6	7	3	*	*	1	5	0	6	7	5	*	0	10	4.9	82.5	82.8
Total	561	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

*Less than 0.5 percent.

OCEAN AREA.—*Position: 05°–10° N., 110°–115° E., years covered, 1879–1933*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind										Weather													
		Mean velocity (knots)	Percentages of observations from									Percentages of observations recording											Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility			
January	94	12.5	32	59	1	1	1	2	1	2	1	1	0	0	0	3	0	3	4	6	0	1	11	4.7	79.9	80.0
February	81	12.5	29	51	4	1	1	3	4	4	3	7	1	0	0	8	0	4	7	4	0	0	11	4.4	79.6	79.4
March	64	9.7	13	68	5	2	5	2	2	2	1	5	0	0	0	3	0	3	2	2	0	2	22	4.1	81.3	80.6
April	98	6.5	13	48	12	7	3	3	4	3	7	2	0	0	0	4	0	4	4	5	0	0	11	4.9	83.5	82.4
May	101	6.5	4	17	12	9	8	33	6	6	6	0	0	0	0	5	0	11	9	3	0	0	8	5.0	84.2	83.7
June	82	11.6	4	3	3	4	8	57	10	4	7	2	0	0	0	6	0	10	5	17	0	4	11	5.7	83.3	83.9
July	106	11.1	3	2	3	1	5	61	13	7	4	6	0	0	1	10	0	8	8	12	1	0	7	6.0	82.9	83.0
August	102	14.0	0	4	1	2	7	68	13	3	2	1	2	0	2	5	0	11	3	9	0	1	6	5.4	83.4	82.9
September	92	9.7	2	4	2	1	15	63	15	3	5	5	2	0	1	6	0	11	3	8	0	1	12	5.6	82.3	82.0
October	94	9.3	24	16	3	2	8	17	11	13	6	2	0	2	0	2	0	8	2	14	1	2	10	5.2	82.3	82.9
November	82	10.2	24	26	5	8	3	15	6	9	3	1	1	0	0	8	0	8	2	2	1	1	9	6.5	81.9	82.0
December	84	13.0	28	47	6	6	2	2	2	6	1	5	0	1	0	16	0	6	3	7	0	1	8	6.4	80.0	80.8
Mean	-----	10.6	15	29	5	3	6	26	7	5	4	3	*	*	*	7	0	7	4	7	*	1	10	5.3	82.0	82.0
Total	1,080	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

*Less than 0.5 percent.

OCEAN AREA.—*Position: 05°–10° N., 115°–120° E., years covered, 1879–1933*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind: Mean velocity (knots)	Wind: Percentages of observations from North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Weather: Percentages of observations recording Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
January	91	10.6	17	69	5	5	0	1	0	2	1	1	0	1	0	6	0	8	7	8	1	0	5	5.2	80.9	81.0
February	97	10.2	28	60	6	1	1	1	3	0	0	2	3	0	0	4	0	3	2	4	0	1	6	4.6	79.9	80.1
March	83	7.6	22	59	8	1	0	2	4	1	3	7	0	0	0	2	0	1	2	6	0	0	17	4.1	81.8	81.4
April	81	5.3	12	26	20	11	2	10	9	4	6	12	7	0	0	2	0	2	5	7	0	0	14	4.4	83.5	82.7
May	72	3.9	5	9	19	7	9	19	11	5	16	4	0	0	0	1	0	1	12	3	0	0	12	4.3	84.8	83.9
June	75	5.3	5	11	24	14	16	18	7	1	4	1	0	0	0	5	0	9	5	5	0	0	12	4.9	82.5	83.5
July	77	8.4	3	6	2	12	18	42	8	0	9	1	1	0	1	3	12	0	8	10	14	0	13	5.4	82.8	83.6
August	68	8.4	3	4	6	7	21	42	9	4	4	4	1	0	0	3	0	0	12	10	9	0	12	5.0	82.4	82.1
September	92	9.7	2	4	2	1	15	53	15	3	5	5	2	0	1	6	0	0	11	3	6	0	12	5.6	82.3	82.0
October	109	6.0	7	21	14	5	13	17	9	8	6	1	0	0	2	10	0	3	4	10	3	1	5	5.3	82.8	83.2
November	105	8.5	14	31	2	1	9	13	6	16	8	2	2	1	0	6	0	9	5	4	1	3	14	5.5	82.2	83.1
December	83	9.3	17	52	5	2	6	5	2	8	3	4	1	0	1	5	0	14	5	4	2	0	7	5.1	81.2	81.7
Mean	.....	7.6	11	29	10	6	9	19	7	4	5	4	1	*	1	5	0	7	6	7	1	1	11	5.0	82.3	82.4
Total	1,033	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Less than 0.5 percent.

OCEAN AREA.—*Position: 00°–05° S., 100°–105° E., years covered, 1883–1933*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind: Mean velocity (knots)	Wind: Percentages of observations from North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Weather: Percentages of observations recording Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
January	41	6.0	7	5	2	6	8	13	13	32	12	0	0	0	0	17	0	7	2	10	0	0	12	7.1	.....	.....
February	50	5.3	3	10	8	11	5	10	26	24	8	4	0	0	0	12	0	8	12	2	0	0	12	8.0	.....	.....
March	53	6.0	10	12	4	8	0	14	22	26	4	0	0	0	0	4	0	15	8	19	0	0	11	8.8	.....	.....
April	60	5.7	2	10	12	13	8	7	17	19	12	2	0	0	0	8	0	18	8	5	0	0	12	6.4	.....	.....
May	49	4.6	2	7	20	27	13	4	11	4	17	0	0	0	0	4	0	6	2	8	0	0	2	5.5	.....	.....
June	69	4.6	3	5	8	22	11	10	11	18	12	3	0	0	1	8	0	13	9	6	0	0	4	5.9	.....	.....
July	47	7.5	14	7	6	10	7	2	2	12	2	2	0	0	0	6	0	8	8	2	0	0	2	5.7	.....	.....
August	50	6.8	4	2	20	27	13	8	10	10	6	6	0	0	0	10	0	14	8	6	0	0	10	7.0	.....	.....
September	61	7.2	2	4	5	25	9	14	16	20	5	3	2	0	2	15	0	16	10	18	0	3	7	7.4	.....	.....
October	71	7.2	11	5	5	18	7	11	17	22	4	8	0	3	0	12	0	10	4	11	0	0	4	7.3	.....	.....
November	56	6.8	6	4	8	18	6	12	10	30	6	2	0	2	0	14	0	18	9	7	0	2	7	6.8	.....	.....
December	45	7.6	6	2	0	11	9	7	31	33	2	0	2	0	0	29	0	4	2	9	0	2	.....	7.7	.....	.....
Mean	.....	6.3	6	6	8	19	8	9	15	21	8	2	*	*	*	12	0	11	7	9	0	*	8	6.6	.....	.....
Total	652	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

*Less than 0.5 percent.

OCEAN AREA.—*Position: 00°–05° S., 105°–110° E., years covered, 1879–1934*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind										Weather											Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
		Mean velocity (knots)	Percentages of observations from									Percentages of observations recording													
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility			
January	63	9.3	23	5	5	5	2	7	17	36	0	3	0	0	3	14	0	6	6	9	3	0	5	5.7		
February	124	6.8	30	5	4	2	2	4	15	32	6	1	1	0	0	7	0	5	4	3	1	2	12	5.0		
March	122	4.6	19	5	4	8	3	8	13	23	17	5	0	2	0	5	0	4	8	2	0	1	8	4.8		
April	290	3.6	14	10	13	12	10	6	10	9	16	1	0	0	1	7	0	4	7	11	0	0	5	5.4		
May	190	5.3	5	9	21	23	11	7	8	6	10	2	1	1	1	3	0	5	8	7	0	0	5	5.3		
June	187	7.6	1	3	24	36	19	6	5	0	6	3	0	1	0	7	0	5	9	6	1	0	6	5.2		
July	130	8.4	3	2	33	42	10	2	4	1	3	6	0	1	0	3	0	1	8	1	0	0	4	4.5		
August	136	9.7	1	4	33	40	11	4	4	1	2	4	0	0	0	4	0	4	7	9	0	0	2	4.5		
September	86	8.0	2	3	28	40	12	11	0	2	2	13	0	0	0	3	0	7	1	5	0	0	16	4.5		
October	184	7.6	5	7	23	24	20	9	6	3	3	15	2	1	1	7	0	7	12	12	1	1	4	5.1		
November	176	5.3	8	5	11	7	10	21	16	10	12	5	1	0	1	7	0	9	6	5	0	1	5	5.0		
December	122	6.8	17	2	2	2	5	13	24	29	6	3	0	0	0	12	0	7	5	8	0	0	2	5.5		
Mean		6.9	11	5	17	20	9	8	10	13	7	5	*	1	1	7	0	5	7	6	1	*	6	5.0		
Total	1,810																									

*Less than 0.5 percent.

OCEAN AREA.—*Position: 00°–05° S., 110°–115° E., years covered, 1879–1933*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind										Weather											Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
		Mean velocity (knots)	Percentages of observations from									Percentages of observations recording													
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility			
January	17	8.0	7	7	7	13	0	14	25	20	7	0	0	0	0	12	0	6	0	6	0	0	12	5.5		
February	15	7.6	0	7	0	0	7	14	36	14	0	7	7	0	0	0	0	7	0	0	0	0	27	3.6		
March	7	5.7	0	0	0	0	0	43	29	0	28	0	0	0	0	14	0	14	0	0	0	0	29	5.4		
April	24	5.3	0	10	28	10	5	19	13	10	5	0	0	0	0	0	0	25	17	17	0	0	12	5.9		
May	15	6.5	0	0	21	36	7	7	0	7	0												7	5.2		
June	25	10.2	4	0	40	32	0	0	16	0	8	8	0	0	0	12	0	8	0	0	0	0	4	5.5		
July	26	9.7	0	4	32	36	4	0	4	0	0	0	0	4	0	8	0	0	0	4	0	0	4	4.9		
August	19	12.5	0	0	32	58	5	0	0	0	5	5	0	0	0	0	0	5	0	0	0	0	21	4.6		
September	19	11.8	0	6	39	39	6	10	0	0	0	5	0	0	0	0	0	0	0	0	0	0	11	6.0		
October	21	7.6	5	0	39	29	5	5	10	0	7	10	0	0	0	5	0	5	10	5	0	0	10	4.5		
November	24	5.3	4	8	13	18	9	22	8	8	6	0	8	0	0	8	0	8	0	8	0	0	4	6.2		
December	13	8.9	16	8	0	0	0	8	42	26	0	0	0	0	0	24	0	16	0	0	0	0	16	6.8		
Mean																									
Total	225																								

*Less than 0.5 percent.

OCEAN AREA.—*Position: 00°–05° S., 115°–120° E., years covered, 1879–1933*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind: Mean velocity (knots)	Wind: Percentages of observations from North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Weather: Percentages of observations recording Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
January	45	6.5	32	10	3	3	3	8	15	15	11	0	0	0	0	4	0	9	13	2	0	0	18	6.3	------	------
February	55	6.8	22	18	8	6	14	6	6	20	0	2	0	0	0	7	0	0	11	7	0	0	11	5.7	------	------
March	56	6.0	30	15	6	0	0	8	8	20	13	4	0	0	0	7	0	7	7	4	0	0	27	5.3	------	------
April	67	6.5	15	10	22	13	9	7	4	11	9	0	0	0	0	1	0	10	12	4	0	0	12	5.2	------	------
May	87	4.6	10	18	9	11	13	15	4	6	14	5	0	0	0	9	0	8	3	5	0	0	5	5.7	------	------
June	106	6.0	5	3	15	27	19	9	7	6	9	2	0	0	3	8	0	6	6	4	0	0	10	4.7	------	------
July	81	6.5	2	3	12	45	7	16	4	3	8	0	0	0	0	4	0	4	2	4	0	0	9	4.3	------	------
August	56	7.2	0	2	11	31	38	4	4	6	4	0	0	0	0	4	0	2	7	2	0	0	41	4.2	------	------
September	113	6.5	7	4	13	27	22	8	5	9	5	18	1	0	1	3	0	4	4	1	0	0	1	5.2	------	------
October	112	4.9	7	6	12	20	27	12	3	4	9	9	0	0	1	5	0	1	18	4	0	0	12	4.8	------	------
November	84	3.9	7	14	2	9	18	10	11	13	16	4	1	0	0	2	0	1	7	2	0	0	11	5.0	------	------
December	82	4.9	17	5	2	7	9	12	12	24	12	2	1	0	0	8	0	4	4	6	0	1	15	6.2	------	------
Mean	------	5.9	13	9	10	16	15	10	7	11	9	4	*	0	*	5	0	5	8	4	*	*	14	5.2	------	------
Total	944	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

*Less than 0.5 percent.

OCEAN AREA.—*Position: 05°–10° S., 100°–105° E., years covered, 1879–1933*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind: Mean velocity (knots)	Wind: Percentages of observations from North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Weather: Percentages of observations recording Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility	Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
January	148	6.5	4	2	6	17	16	10	22	14	9	1	0	0	0	10	0	7	6	9	0	1	7	5.7	------	------
February	105	7.2	8	2	11	10	8	10	30	13	8	2	2	0	1	4	0	15	2	7	0	1	3	5.4	------	------
March	139	7.2	7	6	17	14	7	11	17	14	7	1	1	1	1	10	0	13	6	12	0	1	5	5.9	------	------
April	120	6.5	4	9	21	24	10	6	8	6	12	1	1	0	0	5	0	7	5	10	0	3	7	5.4	------	------
May	84	8.0	1	8	21	50	7	6	6	1	0	2	0	0	0	5	0	6	0	2	0	1	5	4.6	------	------
June	129	10.2	3	8	27	40	9	3	2	6	2	0	0	0	1	7	0	5	3	9	0	2	7	4.9	------	------
July	111	10.2	1	4	28	50	2	2	6	5	2	2	0	0	0	6	0	6	2	5	0	0	6	5.3	------	------
August	91	14.0	0	3	25	62	7	0	1	2	0	3	0	0	0	5	0	1	2	7	0	1	15	5.6	------	------
September	95	12.5	3	1	22	54	4	6	5	5	0	7	4	0	0	5	0	8	3	17	0	1	12	6.2	------	------
October	82	11.6	1	9	14	52	9	3	3	3	6	5	0	0	1	11	0	11	4	6	0	1	5	5.9	------	------
November	123	10.6	3	2	10	45	8	8	12	6	6	11	4	0	2	12	0	9	11	10	0	1	4	5.5	------	------
December	121	7.2	2	10	5	28	15	10	11	13	6	0	1	0	0	8	0	8	1	11	0	0	3	5.7	------	------
Mean	------	9.3	3	5	17	37	9	6	10	8	5	4	1	*	1	7	0	8	4	8	0	1	7	5.5	------	------
Total	1,348	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------

*Less than 0.5 percent.

OCEAN AREA.—*Position: 05°–10° S., 105°–110° E., years covered, 1879–1934*

[Greenwich Noon observations]

Month	Number of observations surveyed	Wind										Weather											Mean cloud amount (0-10)	Average air temperature	Average sea surface temperature
		Mean velocity (knots)	Percentages of observations from									Percentages of observations recording													
			North	Northeast	East	Southeast	South	Southwest	West	Northwest	Calm	Haze	Mist	Fog	Drizzle	Rain	Snow	Showers	Thunderstorms	Light to moderate squalls	Heavy squalls	Gales (force 8 or over)	Exceptional visibility			
January	66	7.6	7	5	8	3	10	16	29	15	7	3	0	0	2	8	0	8	15	11	0	0	8	6.3	-----	-----
February	88	9.7	11	1	1	4	8	14	30	26	5	1	0	0	0	8	0	5	13	12	0	0	5	6.3	-----	-----
March	104	8.4	8	10	17	8	4	14	20	14	5	3	0	1	0	4	0	6	9	11	0	1	3	5.9	-----	-----
April	102	5.7	6	13	19	13	8	10	10	8	13	2	1	1	1	5	0	5	2	8	0	1	7	5.1	-----	-----
May	141	6.8	4	11	27	21	9	7	4	10	7	2	0	0	1	1	0	2	10	5	0	0	4	5.0	-----	-----
June	227	8.0	6	13	29	26	9	7	3	1	6	4	0	2	1	7	0	4	10	6	0	1	3	4.9	-----	-----
July	254	8.9	4	12	39	18	8	5	4	4	6	5	0	0	1	7	0	2	8	7	0	1	6	4.6	-----	-----
August	164	9.7	2	15	41	19	10	6	1	2	4	11	1	1	1	2	0	5	2	7	0	0	5	5.5	-----	-----
September	106	9.3	3	18	26	27	9	4	2	6	5	14	1	0	1	4	0	3	5	6	0	1	6	4.8	-----	-----
October	143	8.9	7	7	24	24	9	12	7	4	6	13	0	1	0	2	0	3	6	5	0	0	3	4.9	-----	-----
November	149	6.8	4	9	8	22	9	19	19	3	7	5	1	0	0	7	0	7	7	13	0	0	7	5.5	-----	-----
December	99	9.3	4	3	3	6	17	40	20	6	1	2	0	0	1	15	0	12	6	14	0	0	1	5.7	-----	-----
Mean	-----	8.3	6	10	20	16	9	13	12	8	6	5	*	1	1	8	0	5	8	9	0	*	5	5.4	-----	-----
Total	1,751	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

*Less than 0.5 percent.

GLOSSARIES

Words occasionally found on the charts and in the Sailing Directions

MALAY

Malay	English
Alang-alang	Reeds.
Api	Fire.
Arang	Coal.
Arus	Current.
Ayer	Fresh water.
masin	Salt water.
pasang	Flood or high tide.
surut	Ebb or low tide.
Baharu	New.
Barat	West.
Batang	River.
Batu	Rock, stone, reef.
Besar	Large, great
Besi	Iron.
Beting	Shoal, sand.
Bukit	Hill.
Burung	Bird.
Chi	River.
Dalam or Dalem	Deep.
Darat	Coast, land.
Gadong	House.
Gosong	Reef of rocks.
Gunong	Mountain.
Ikan	Fish.
Itam or Hitam	Black.
Jalan	Road.
Jambatan	Mole, jetty.
Kalapa	Coconut.
Kaler	North.
Kali	River.
Kampong	Village.
Kapal	Ship.
Karang	Coral, coral reef.
Kawala or Kwala	Mouth of a river.
Kechil	Little, small.
Kering	Dry.
Kidul	South.
Kring	Dry.
Kuala	Mouth of a river.
Kulon	West.
Labuan	Anchorage, bay.
Lama	Old.
Laut	Sea.
Layar	Sail.
Lor	North.
Lumpar or Lumpur	Mud.
Malang	Reef, rock, shoal.
Muara	Mouth of a river.
Napo	Reef.
Negri	Town.
Nipa	Small marsh palm.
Nusa	Island.
Panjang	Long.
Pantei	Coast, seaboard.
Pasang besar	High tide.
kring	Low tide.
naik	Flood tide.
surut	Ebb tide.
turun	Ebb tide.
Pasir	Sand, shoal.
Pingir laut	Coast, seaboard.
Pisang	Banana.
Prau, prahu	Boat, ship.
Pulau, pulo	Island.
Putih	White.
Renda	Low.
Ruma	House.
Salatan	South.
Sampan	Small boat.
Sayuran	Vegetables.
Selat	Channel, strait.
Sungai, sungei	River or stream.
Tanah	Land.
Tanjong	Cape, point.
Tekong	Reef.
Telok, teloek, teluk	Bay.
Tepilaut	Coast, seaboard.
Timur	East.
Tobor	Shallow.
Tokong	Reef, rock, island.
Trumbu	Dangerous hidden shoal.
Trusan	Channel.
Tukoh	Islet.
Tuwak	Old.
Ujong (Java)	Cape, point.
Utara	North.
Wai	River.
Wetan	East.

DUTCH

Dutch	English
Aan	At, near, on.
Ankerplaats	Anchorage.
Archipel	Archipelago.
Baai	Bay.
Balg	Narrow channel between sands.
Bank	Bank.
Berg	Mountain, hill.
Binnen	Inner.
Bocht	Bay, bend, bight.
Boom	Tree.
Bosch	Forest, wood.
Breed	Broad.
Buiten	Outer.
Dam	Breakwater, mole, causeway.
De, den	The.
Diep	Deep.
Drempel	Bar.
Droogte	Bank, shoal.
Dwars	Across, athwart.
Eiland	Island.
Eilanden	Island group.
Eilandje	Islet.
Gat	Channel, opening.
Gebergte	Mountain range.
Geul	Small channel, ditch.
Groot, -e	Great, large.
Haven	Harbor, port.
Heuvel	Hill.
Hoek	Cape, point, hook.
Hoog	High.
Hout	Timber, wood.
Kaap	Cape, headland, beacon.
Kade	Quay, wharf.
Kanaal	Canal.
Klein	Small.
Klip	Rock, crag, cliff.
Laag, lage	Low.
Lang	Long.
Meer	Lake, pond.
Middel, midden	Middle.
Mijl	Mile.
Modder	Mud.
Mond, -ing	Estuary.
Nauw	Narrows.
Nieuw, -e	New.
Noord	North.
Noorder	Northern.
Ondiepte	Bank, shoal.
Oost	East.
Oud, -e	Old.
Plaat	Bank, shoal.
Plaatje	Small shoal.
Platen	Banks, shoals.
Punt	Point.
Reede	Roadstead, road.
Rif	Reef.
Rivier	River, stream.
Rood, -e	Red.
Rots	Rock, rocky islet.
Schiereiland	Peninsula.
Slik	Mud.
Spoorweg	Railway.
Stad	City, town.
Steen, -en	Stone, stones.
Steile	Steep.
Straat	Strait.
Stroom	Current, stream.
Vaart	Canal.
Vaarwater	Fairway, channel.
Van	Of.
Valsch	False.
Vlakte	Flat below water.
Wad	Shore bank that dries.
Wal	Bank, shore, wall.
Waterweg	Waterway.
Weg	Way.
West	West.
Wester	Western.
Wit, -te	White.
Zand	Sand.
Zee	Sea.
Zeegat	Entrance to a river or inland waters from the sea.
Zuid	South.
Zwart	Black.

GLOSSARIES

NEW (ALTERNATE) NAMES

The following list, applicable to this volume, is given here to assist the mariner in identifying features whose names are being converted to Indonesian (or otherwise) on the newer charts. The list can be used in conjunction with the Index, which follows on the succeeding pages.

Note also that the vowel "oe" in Indonesian names can be rendered by the letter "u", which may account for alternate spelling in some cases.

Obsolete Name	Sect. No.	New Name	Obsolete Name	Sect. No.	New Name
Alkmaar Eilandje	4–53	Damar Kechil	Meeuwen Eiland	3–14	Peutjang
Amsterdam Eiland	4–58	Utungdjawa, Pulau	Meinderts Droogte	4–58	Meinderts Shoal
Batavia	4–92	Djakarta	Menschenetter Eiland	4–60	Laki, Pulu
Belantoeng, Tanjoeng	3–81	Lubuk	Middelburg Eiland	4–58	Rambut, Pulu
Boompjes Rif	3–144	Barak, Gosong	Neptunus Droogte	4–76	Neptunus Reef
De Steen Rif	4–84	Kelor, Karang Pulu	Ondiepwater Eiland	6–6	Shoalwater (Simedang) Island
Derde Punt	5–20	Selokan, Tanjoeng			
Dwars in den Weg	3–133	Sangiang, Pulau	Onrust Eilandje	4–84	Kapal, Pulu
Edam Eiland	4–53	Damar Besar, Pulau	Oosthaven	3–105	Pandjang
Eerste Punt	3–13	Lajar, Tanjong	Prinsen Eiland	3–16	Panaiten
Enkhuizen Eilandje	4–53	Njamuk Kechil, Pulau	Purmerend Eiland	4–84	Sakit, Pulu
Gebroeders Eilanden	3–143	Dua, Pulau	Rots Hoek	3–32	Sorga, Karang
Groot Kombuis Eiland	4–58	Lantjang, Pulu	Rotterdam Eiland	4–60	Ubi Besar
Haarlem Eilandje	4–59	Ajer Kechil	Schiedam Eiland	4–60	Ubi Ketchil
Hoog Eiland	3–141	Kandang Kechil	St. Nicolaaspunt	3–48	Tandjung Pudjut
Hoorn Eilandje	4–59	Ajer Besar	Straat Bangka	5–2	Bangka Strait
Hout Eiland	3–142	Pandjurit	Steile Hoek	3–137	Sumur Batu
Kembung	5–23	Hoog Eil	Struisvogel Klippen	4–57	Ostrich Rocks
Kerkhof Eilandje	4–74	Kelor	Toppershoedge	3–135	Tempurang
Klein Kombuis Eiland	4–58	Bokor, Pulu	Tweede Punt	3–15	Alang Alang, Tanjong
Kuiper Eilandje	4–74	Tjipir, Pulu	Vader Smit Rif	4–76	Puteri, Pulu
Layar, Tanjong	3–13	Lajar, Tanjong	Varkens Hoek	3–122	Tua, Tanjong
Leiden Eilandje	4–53	Njamuk Besar	Vlakke Hoek	3–50	Balimbing, Tjukuh
Mathilde Rif	4–84	Perut, Karang	Zutphen Eilanden	3–139	Kepulauan Sumur

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